GEOTECHNICAL INVESTIGATION
ALIGNMENT STUDY AND PAVEMENT DESIGN SOUTHERN SEGMENT, LAS VEGAS BELTWAY, SECTION 6
CLARK COUNTY, NEVADA
31-215904-001

Prepared for:

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical investigation for the Southern Segment of the Las Vegas Beltway, Section 6 alignment. The Section 6 alignment extends westward from midway between Las Vegas Boulevard and I-15 to Decatur Boulevard. Associated frontage roads, access ramps, and reconstruction of Valley View Boulevard in the contract area are addressed in this report.

1.2 PROJECT DESCRIPTION

This phase of the proposed Las Vegas Southern Beltway will consist of constructing a depressed, limited access highway including frontage roads near existing grade and access ramps which transition between the depressed and at-grade highways. This segment will include six bridge structures. The Kleinfelder Geotechnical Investigation Report dated February 9, 1996 addresses these bridge structures.

The purposes of this investigation were to:

- Evaluate the nature and engineering properties of subgrade soils along the proposed roadway alignment.
- Evaluate potential geotechnical risks to the proposed roadways.
- Provide recommendations for excavation, site grading, subgrade preparation, fill placement and compaction and moisture protection.
- Perform engineering analyses and provide suitable pavement structural sections for the traffic projections provided and the soil conditions encountered.
- Discuss existing site conditions with regard for site grading, excavation difficulties and construction methods.

The proposed Las Vegas Beltway alignment evaluated in this Section 6 report extends from near Las Vegas Boulevard to Decatur Boulevard. The main roadway will be depressed below existing site grade from Las Vegas Boulevard to near Valley View Boulevard and elevated over the Union Pacific Railroad and Decatur Boulevard. Frontage roads will be constructed near existing site grade. The depth below existing grade to the planned road grade varies from 0 to 30 feet. Entrance and exit ramps will transition between the proposed road grade and existing site grade. The primary alignment is approximately two miles in length. Including entrance ramps, exit ramps and frontage roads, the total length of the highway segments addressed by this report is approximately six miles.

The site is located approximately as shown on the attached Figure 1. Six bridge structures are planned along the alignment. Earth retaining structures are planned at Ramps R-5 and R-6 and along the alignments near Warm Springs Road and the approach to the R-3 Over R-2 bridge. Permanent 2:1 (horizontal:vertical) cut or fill slopes are planned along the remainder of the alignment at grade changes. Design recommendations for the bridge structures are provided in our report dated February 9, 1996. We anticipate that some water, sewer, electrical, phone and drainage control utilities will be located along or crossing the alignments.

This report provides recommendations for excavation, site preparation, cantilever concrete retaining walls, soil nail slope stabilization and mechanically stabilized embankments, utility bedding and backfill and the pavement structural sections for the projected traffic.

2.0 FIELD EXPLORATION

The subsurface conditions were explored by drilling 67 borings along the proposed roadway alignments. Ten (10) of these borings were drilled at drainage structures and stormwater detention basins. The borings were drilled to depths ranging from 5 to 31 feet below existing site grade. The depth of the explorations was based on preliminary bridge and profile drawings and discussions with Parsons Brinckerhoff personnel. The borings were typically extended to a depth of 5 to 10 feet below the anticipated road or drainage structure grade.

The borings were located on approximately 500 foot centers and in a pattern so as to obtain a general profile of the subgrade soils along the alignments. The borings were located in the field by survey stakes placed by G. C. Wallace Engineers. The boring locations and elevations referenced to the 1983 NAD Coordinate System, are presented on the Boring Log and Test Summary Plates in Appendix A. The field explorations were located approximately as shown on Figures 2 through 7 attached to this report.

The borings were drilled with truck mounted drill rigs equipped for soil sampling. Borings were advanced by continuous flight hollow stem auger methods. Representative soil samples were obtained and penetration resistance tests were performed using the Standard Split Spoon Sampler (SPT). Relatively "undisturbed" representative soil samples were obtained from borings using a 1.93-inch inside diameter tube-lined modified California Spoon Sampler (Ca). The penetration tests were performed with a 140-pound hammer free-falling through a distance of 30-inches in accordance with American Society for Testing and Materials (ASTM) Test Method D-1586.

The sampler driving resistance, expressed in "blows per 12 inches of penetration", is presented on the drill logs at the respective sampling depths. Where penetration resistance exceeded 50 blows per foot or where the sampler refused to penetrate (bounced) prior to achieving one foot of penetration, the penetration resistance is presented as blows per number of inches of penetration.

Large representative bulk samples were obtained from the borings at a depth of 0 to 10 feet below the anticipated road grade. The bulk samples for sieve analyses, Atterberg limits, and R-value tests were obtained as cuttings during drilling. The test results from these samples could vary from test results on samples obtained by other excavation methods.

Soil samples obtained from the borings were classified and the consistency and moisture conditions were recorded by the field geologist during drilling. Representative portions of each soil sample were packaged and transported to the laboratory for additional testing and evaluation, as appropriate. Logs of the borings are presented in Appendix A as Plates A-1 through A-67.

A key to the soil symbols and terms used on the Boring Log and Test Summary Sheets is presented in Appendix A on Plate A-68.

3.0 LABORATORY TESTING

3.1 GENERAL

Representative soil samples from the borings were tested to evaluate their pertinent engineering properties. The tests performed on soil samples from borings at the bridge sites were directed toward evaluating strength and compressibility characteristics of the foundation soils. Results from these tests are presented in our geotechnical bridge design report, dated July 26, 1995. The complete bridge site boring logs along with the grainsize analyses, Atterberg Limits, moisture/density and chemical analyses test results are presented in that report and were utilized in evaluating subsurface soil conditions with regard for excavations, subgrade support, moisture conditions, expansion potential, excavation rebound, slope stability and corrosivity.

3.2 MOISTURE/DENSITY TESTS

The natural moisture content of 130 soil samples from the borings was measured in accordance with ASTM Test Method D-2216. The moisture content, expressed as a percent of the dry sample weight is presented on the Boring Log and Test Summary Plates in Appendix A. The test results are shown at their respective sampling depth. Where relatively undisturbed samples could be obtained, the dry density of the soil sample was measured. The test results from 56 soil samples are presented on the Boring Logs and Test Summary Plates in Appendix A at their respective sampling point. The dry density and wet unit weight test results are expressed as pounds per cubic foot (pcf).

3.3 GRAINSIZE ANALYSES TESTS

Sieve analyses were performed on 41 soil samples from the test borings drilled along the Section 6 segment of the Las Vegas Southern Beltway Alignment. The majority of these soil samples were obtained from a depth of 0 to 10 feet below the proposed road grade. The sieve analyses tests were performed in accordance with ASTM Test Method D-2487 to verify the visual classification by the field geologist and classify the soils in accordance with the Unified Soil Classification System. The test results are presented on Plates B-1 through B-14 in Appendix B following the text of this report.

3.4 ATTERBERG LIMITS TESTS

Liquid limit and plastic limit tests were performed on 40 soil samples from the test borings. The tests were performed to evaluate the plasticity of the clay component of the soil sampled and to aid in classification. The tests were performed in accordance with ASTM Test Method D-4318. The test results are presented on Plates B-15 through B-19 in Appendix B following the text of this report.

3.5 DIRECT SHEAR TESTS

Direct shear test results for 5 samples from above or near the subgrade elevation are presented on Plates B-20 in Appendix B following the text of this report. The test results were considered during evaluation of cut and fill slope stability analyses. The tests were performed in accordance with ASTM Test Method D-3080.

3.6 R-VALUE TESTS

Fourteen (14) R-value tests were performed on representative soil samples obtained from borings at depths 0 to 10 feet below the anticipated road subgrade. The soil samples for the R-value tests were selected to provide test results for a broad range of the materials encountered and to characterize the subgrade soils throughout the Section 6 segment of the Southern Las Vegas Beltway alignment. The R-value tests were performed in accordance with ASTM test method D2844. The test results are presented on Plates B-21 through B-34 in Appendix B following the text of this report.

3.7 CORROSION ANALYSES TESTS

Twenty-seven (27) soil samples from the test borings along the Section 6, Southern Las Vegas Beltway Alignment were submitted to Atlas Chemicals Testing Laboratories, Inc. for analyses. The results of their laboratory tests are presented in Appendix B following Plate B-34.

4.0 GENERAL SITE GEOLOGY

4.1 GEOLOGIC SETTING

The Section 6 segment of the Southern Las Vegas Beltway is located in the south western portion of the Las Vegas Valley. The alignment crosses portions of Sections 5 and 6 of T22S, R61E in Clark County, Nevada. The Las Vegas Valley is filled with Quaternary and Tertiary age normally consolidated sediments derived from the surrounding mountains. The valley floor sediments consist of alluvial and playa deposits surrounded by progressively more steeply sloping alluvial aprons derived from erosion of the mountains surrounding the valley. The major source of the alluvium at this site is the Spring Mountain Range located on the west side of the valley. Generally, the gradation of the sediments becomes progressively finer grained with increasing distance from the source area and with decreasing elevation. The alluvial and playa sediments can be several thousand feet thick in this area. Extensive secondary cemented deposits of calcium and magnesium carbonate (caliche and cemented sand and gravel) occur throughout the area at variable depths.

No geologically recent (within the last 10,000 years) bedrock or tectonic faults are known to transect the alluvium at this site. The nearest bedrock fault with evidence of possibly recent displacement is located at the base of Frenchman Mountain. This fault is located approximately 10-1/2 miles east of the site. Tectonic shocks having epicenters within southern Nevada have been minimal. The site is located in an area defined by the AASHTO Acceleration Coefficient Map of the United States as having an acceleration coefficient between 0.07 and 0.10. Earthquake risk will have little affect on design and construction of the depressed, on-grade Section 6 road alignments. Seismic design recommendations for earth retaining structures, bridges, embankments and/or elevated roads are discussed in our geotechnical report for Section 6 bridge structures.

4.2 NON-TECTONIC FEATURES

Nevada Bureau of Mines and Geology, Bulletin 95 by John W. Bell (1981) titled "Subsidence in Las Vegas Valley mapped numerous compaction fault scarps and fissure zones in the Las Vegas

Valley. The origin of the compaction faults is uncertain. No historic earthquakes have been attributed to any of these compaction faults (Slemmons, 1990). Gradual vertical and horizontal movement or "creep" along many of these faults has been historically recognized and attributed to subsidence associated with groundwater withdrawal within the valley (Bell, 1981). One of the compaction faults has been dated at about 14,000 years old.

The Section 6 segment of the Southern Las Vegas Beltway Alignment crosses two to three of the compaction faults mapped by Bell (compiled 1991). The compaction faults are mapped near Decatur Boulevard, between Valley View Boulevard and I-15 and between I-15 and Las Vegas Boulevard. None of the compaction faults mapped along the proposed Section 6 segment of the Southern Las Vegas Beltway Alignment are associated with large topographic relief. Surficial evidence of recent compaction fault or areal subsidence was not observed during our field work for this investigation. Evidence of faulting could not be detected in borings located across or near these mapped compaction faults.

Groundwater was not encountered during drilling in any of the 66 borings to the depths drilled. A Las Vegas Southwest Quadrangle Groundwater map by Katzer, Harrill, Berggren and Plume 1985 indicates that groundwater along the Section 6 segment of the Southern Las Vegas Beltway Alignment should be encountered at approximately 2080 feet MSL at Interstate I-15 and at approximately 2150 feet MSL in the area of Decatur Boulevard. Moist conditions were occasionally encountered immediately above the contract with cemented deposits. Some perched water is likely to occur seasonally near cemented layers.

5.0 GENERAL SITE CONDITIONS

5.1 SURFACE CONDITIONS

The majority of the Section 6 segment of the Southern Las Vegas Beltway Alignment crosses undeveloped desert. The area is relatively flat with a slight overall gradient down toward the east and northeast. Surface elevations range from approximately 2230 to 2340 feet above mean sea level (MSL). No large or well developed surface drainage paths cross the proposed alignment. However, broad flash floodways cross the alignment from southwest to northeast near the UPRR crossing, Hinson Street and Valley View Boulevard. Surface runoff was by sheetflow to existing road ditches.

Natural vegetation was sparse and consisted primarily of creosote bush and white bursage. Regraded areas were bare of vegetation.

Throughout the Section 6 segment of the Southern Las Vegas Beltway Alignment, regrading prior to our field exploration appears to have been limited to cut and/or fill depths of three feet or less.

5.2 SUBSURFACE CONDITIONS

Natural soil encountered in the borings was quite variable. In general, the soils become progressively more fine grained from west to east along the alignment. The soils also typically become more fine grained with increased depth. The native soils ranged from coarse grained, rounded to sub-rounded alluvial gravel, silty gravel, sand and silty sand to fine grained, low to high plastic, silty clay and sandy clay. The majority of the gravel was less than 3 inches in diameter. The general trend of isolated lenses, stratified deposition and sorting from west to east and with depth is consistent with alluvial deposition on a broad gently sloping alluvial fan and playa land form.

Fully cemented caliche and/or calcium and magnesium carbonate cemented sand and gravel strata were not encountered in the 66 borings along the Section 6 segment of the Southern Las Vegas Beltway Alignment. However, partially cemented soils were encountered in 15 of the 66 borings. Cemented deposits are a common occurrence in alluvial deposits of the desert southwest United States. The partially to moderately cemented sand and gravel strata typically ranged from a few inches to 5 to 10 feet in thickness. The depth to partially cemented soil, thickness and lateral extent of these deposits was quite variable. The degree of cementation and hardness were also quite variable.

Partially cemented hard and very dense deposits will be difficult to excavate with conventional earth moving equipment. Pre-fracturing with explosives, a hydraulic or pneumatic hammer or a headache ball may be necessary. Thin lenses a few inches thick and partially cemented, very stiff or dense layers may require ripping with heavy equipment.

6.0 ENGINEERING ANALYSES AND RECOMMENDATIONS

6.1 GENERAL

As previously noted, subsurface soil conditions near the anticipated subgrade elevation are quite variable along the alignment. From Las Vegas Boulevard west, the subgrade soils for frontage roads, ramps, and the beltway consist primarily of silty sand, clayey sand and silty, clayey sand mixtures with some gravel. In some areas the subgrade soils are partially cemented and occasional lenses of fully cemented sand and gravel or caliche should be anticipated at subgrade. Occasional low plastic clay layers and isolated areas of highly plastic soil should be anticipated at the subgrade elevation. Excavation in fully cemented rock-like materials will be difficult or impossible using "scrapers" and heavy tractors even those equipped with a ripper tooth. A hydraulic or pneumatic rock breaker, headache ball or possibly explosives may be necessary to excavate the cemented deposits. Partially cemented soils and other materials where the Standard Penetration Test (SPT) resistance was less than 50 blows per foot may allow excavation with scrapers sometimes proceeded by ripping with a heavy tractor. It may be necessary to rip or otherwise loosen dense granular soils and very stiff to very hard fine grained soil to economically excavate these materials.

6.2 SITE PREPARATION AND GRADING

6.2.1 Excavations

Excavation will be difficult in some areas due to the presence of cemented and partially cemented sand and gravel. Temporary construction excavations in fully cemented material will stand nearly vertical. Construction excavations in partially cemented deposits should be sloped on the order of 1/2:1 to 1:1 (horizontal:vertical) depending on the degree of cementation. Some raveling of these cut slopes should be anticipated. Frequent moistening of these cut slopes could reduce raveling. Excavations in non-plastic soils such as the Poorly Graded Sand and Gravel as well as the Silty Gravel and Silty Sand should be laid back at a slope angle on the order of 1:1 to 1-1/2:1. Moistening these cut slopes will also reduce raveling.

All of the non-cemented soil deposits along the alignment are susceptible to erosion by flowing water. Precipitation in the Las Vegas Valley is relatively infrequent, however storms when they do occur are typically intense. Low deflection berms, temporary channels or other measures should be considered to control storm runoff or the contractor should be prepared for intense localized erosion, slope failures and subsequent repair work. If seepage is encountered from cut slopes during construction, conditions should be inspected by the geotechnical engineer of record. Some dewatering, shoring or flattening of cut slopes could become necessary to stabilize slopes.

Permanent cut slopes in soil should be flattened to at least 2:1 (horizontal:vertical). Review of the planned cut slopes is recommended. Flatter slopes may be required if seepage or loose conditions are encountered. Surface drainage at the crest of cut slopes should be carefully designed and controlled to minimize erosion. Runoff should be carried down these slopes in metal culverts, asphalt or concrete lined or otherwise armored channels.

Excavations in medium dense to dense granular soils and stiff to very stiff clay soils should be possible with conventional earth moving equipment. Hard clay soils, dense to very dense granular soils and partially cemented materials may require ripping to aid in excavation. Excavation of hard to very hard caliche deposits and very dense cemented sand and gravel deposits will probably require the use of a hydraulic or pneumatic backhoe-mounted hammer or a crane and headache ball. A qualified blasting subcontractor and consultant should be retained to determine the spacing, size and blasting sequence appropriate for this site. Consideration should be given to blasting vibration effects on nearby facilities and structures and monitoring during construction. Specific recommendations for the use of explosives to fracture the cemented materials at this site is beyond our scope of work for this project.

6.2.2 Subgrade Preparation

After completion of excavation to the design subgrade elevation, the subgrade should be scarified to a depth of 6-inches, brought to the optimum moisture content and compacted to a minimum of 90 percent of the materials maximum dry density as established by American Society for Testing and Materials (ASTM) Test Method D-1557. If caliche or cemented sand and gravel are exposed at the subgrade elevation, scarification and compaction will not be necessary. Any depressions should be filled to the subgrade elevation and compacted as recommended above. If soft or pumping conditions are encountered, the area should be overexcavated to a depth of 12-inches. The overexcavated area should be covered with an appropriate separator and reinforcing geotextile fabric and backfilled with NDOT Type II, Class B or Clark County Type II aggregate base course. This stabilizing fill should be compacted to a minimum of 90 percent of the maximum dry density as established by ASTM Test Method D-1557.

Foundations for soundwalls and light weight structures (service loads up to 15 kips) such as storm drain head walls and outlet structures may be designed for a maximum net bearing pressure of 3,000 psf throughout the project site.

Clay soils exposed at the design subgrade elevation should be kept moist and not allowed to dry out and crack. If the soils become dried and cracked prior to construction, the clayey subgrade soils should be soaked and the moisture content increased to the optimum moisture content for compaction. As an alternative, any dried or cracked clay soils could be removed and replaced with properly compacted, approved soil at an acceptable moisture content.

6.2.3 Engineered Fill

Engineered fill required to raise the roadbed to the design subgrade elevation should consist of low plastic, non-gypsiferous soil containing no rock larger than 6-inches. Expansion potential should be limited to less than four percent under a 60 psf surcharge when wetted from an air-dried to nearly saturated condition. Solution loss due to leaching with deionized water should be limited to less than four percent by weight. Engineered fill should be free of vegetation and debris.

A majority of the soils encountered during our field exploration will be suitable for use as engineered fill. Highly plastic clay soils were encountered at three borings for bridge structures. However these soils were typically encountered below pavement subgrade. Non-plastic to low plastic sand and gravel were predominant at the road subgrade throughout the Section 6 alignment. High plastic clay (CH), if encountered, should be blended with non-plastic granular soils or disposed of in landscaped areas.

Caliche and cemented sand and gravel materials may be used in engineered fill provided they are crushed or otherwise screened to remove all chunks larger than 6-inches in diameter and the material is uniformly graded.

Embankment fill within 3 feet of design subgrade should exhibit a minimum R-value equivalent to the R-value used in design of the pavement supported on the fill (R=45). Engineered fill used to raise the subgrade elevation should be placed in 6 to 8 inch loose lifts, moistened to the optimum moisture content (+/-2 percent) and compacted to a minimum of 90 percent of the maximum dry density (ASTM D-1557).

If the engineered fill thickness will exceed ten feet and long-term settlement is a design factor, the minimum compaction standard should be increased to 95 percent of the maximum dry density (ASTM D-1557) to minimize long-tern settlement and consolidation. A minimum compaction of 90 percent will be adequate for embankment fill where fill consolidation will be of minimal significance. Frequent compaction tests and quality control observation should be performed to evaluate the quality of the fill constructed and verify compliance with construction specifications.

6.2.4 Utility Trench Bedding and Backfill

Based on observations and tests performed during drilling and the laboratory test results, excavations in cemented materials will stand nearly vertical. Excavations in non-cohesive soils are not expected to stand steeper than 1:1 without sloughing and caving. Excavations to five feet deep may be unshored provided they are sloped back at a ratio no steeper than 3/4:1 (horizontal:vertical). Slopes may need to be further flattened or shored based on conditions encountered during construction.

If deep trench excavations are planned, the recommendations provided in our Bridge Design Report for the Section 6, Southern Las Vegas Beltway (dated February 9, 1996) could be used to design shoring. Surcharge loads should be kept a minimum distance of five feet back from the edge of trench excavations or the shoring should be designed to resist the lateral pressures resulting from the surcharge in addition to the lateral earth and any hydrostatic pressure.

Pipe or culvert bedding should consist of granular soil such as clean sand or sand gravel mixtures. NDOT Type I, Class B or Clark County Type II aggregate base course or a similar gradation would provide a suitable bedding material. Bedding should be placed in 6 to 8-inch loose lifts and compacted to at least 90 percent of the maximum dry density (ASTM D-1557). If necessary, the bedding should be manually placed and hand compacted under the pipe haunches to provide uniform support below the spring line.

Trench backfill should consist of engineered fill as previously described. Backfill should be placed and compacted as described in Section 5.2.3. Flooding and jetting is not considered a suitable method for compaction of trench backfill for this project. All fill should be placed and compacted by mechanical methods using equipment of an appropriate size and type for the material being compacted.

The prepared subgrade beneath concrete lined open channels should be covered with a minimum of 4 inches of NDOT A Type I, class B or Clark County Type II base course compacted to a minimum of 90 percent of the maximum dry density (ASTM-1557). Concrete channel liner should include a transverse cut-off wall at each panel to reduce seepage beneath the channel. In addition, weepholes should be constructed at intervals to relieve any hydrostatic pressure from behind the channel walls and channel bottom. The weepholes could be nominally two to four inches in diameter and backed by a drain gravel pocket wrapped in filter fabric to aid in pressure relief. The crest of the channel walls should be turned down or otherwise embedded to control erosion and prevent undermining along the edge of the channel.

6.2.5 Corrosive Soil Conditions

Corrosion analyses were performed on twenty-seven soil samples from the Section 6 segment of the Southern Las Vegas Beltway Alignment. The test results are presented in Appendix B. The test results indicate corrosion potential will be quite variable along the alignment with a relatively severe potential along the beltway alignment. The soils along the alignment were found to contain salts in sufficient concentrations to be considered corrosive to metal and concrete. All concrete in contact with the on-site soils should be formulated using Type V or equivalent sulfate-resistant cement and should be placed with a maximum water-cement ratio of 0.45. Special protection for buried metal pipe will be essential for long-term performance of buried utilities. Consideration should be given to cathodic protection of buried metal pipe, or to the use of PVC pipe for the frontage road and beltway alignment segments. Asphaltic coating or equivalent protection may be adequate along other portions of the alignment.

Based on the gradation of the on-site soils, their plasticity and density characteristics and our local experience, the steady state infiltration rate for detention basin in the project area will be on the order of 0.005 inches per minute. However, during a 2 to 48-hour perios immediately after filling, the infiltration rate should be on the order of 50 to 100 times faster than the steady state condition.

An infiltration rate of 0.25 in/min would be appropriate for detention basin design where the design retention period is on the order of 12 hours to 4 days.

6.2.6 Material Volume Change

Some material volume changes should be anticipated during excavation and placement of fill along the alignment. Excavation of cemented materials (caliche and cemented sand and gravel) will probably result in bulking on the order of 5 to 15 percent. An estimated shrinkage factor of 5 to 15 percent would be appropriate for Gravel, Sand and Clayey Sand materials along the alignment. Shrinkage on the order of 10 to 20 percent should be anticipated for Clay soils excavated along the alignment. As an example of 10 percent shrinkage factor would indicate that 1.10 cubic yards of excavated material would be required to place 1.0 cubic yards of properly compacted fill.

The calculations for developing estimates of shrinkage and bulking characteristics are based on very limited data, and caution should be exercised in the application of shrink-bulk factors in cost estimating and volume calculations. The volume of material tested for developing the estimates is based on less than one-one hundred thousandth of one percent of the total volume of material to be excavated. In addition, other subjective assumptions must be made to perform the calculations, further reducing the accuracy of the results. These include the anticipated relative compaction of the material when placed as fill, changes in moisture content during excavation and placement, uniformity of the materials, and inaccuracies inherent in the test methods on which the calculations are based. Furthermore, the actual construction quantities may be significantly affected by losses during hauling, variations in stripping depth, inaccuracy in topographic maps and grading plans, and other factors unrelated to differences between natural and compacted unit weights. For the reasons cited above, Kleinfelder, Incorporated does not warranty the accuracy of the shrink-bulk factors provided herein, and assumes no responsibility for any losses resulting from their use.

6.2.7 Moisture Protection

The pavement design analyses for the Section 6 segment of the Southern Las Vegas Beltway was based on the assumption that a properly drained road bed will be maintained. Groundwater was not encountered within twenty-five (25) feet below the design road grade in any of the 66 explorations along the alignment. Our historical research of groundwater levels in the vicinity of the Southern Las Vegas Beltway Alignment did not reveal a trend of rising groundwater levels. However, some low lying areas of the valley which are heavily urbanized have experienced a rise in the water level of the near surface aquifer. The rise in shallow groundwater levels is believed to be related to increased irrigation practices. Increased development and irrigation along the Southern Las Vegas Beltway corridor is anticipated. Therefore, subsurface seepage on cemented layers above the existing water table is likely to occur.

Positive drainage should be established away from the edge of paved areas. Joints should be sealed to avoid infiltration of surface runoff into the pavement section. All utility trenches beneath paved areas should be backfield with non-pervious fill or material of similar permeability to the native soil. Pavements should be designed to control runoff. Road shoulders should be sloped away from the pavement at a minimum of two percent where possible. Alternatively, a storm drain system should be installed to remove excess runoff.

6.3 EARTH RETAINING STRUCTURES

Earth retaining structures are planned along Ramps R-10/R9 and R-6/R9 and at the R-3 Ramp over R-2 ramp bridge. Retaining structures may also be required along I-15 at Warm Springs Road. Results of our subsurface exploration in this area were reported in our July 26, 1992 Bridge Structures Design Report. Recommendations for design of earth retaining structures are presented in the above referenced July 26, 1995 report.

6.4 PAVEMENT ANALYSES AND DESIGN

6.4.1 General

The Section 6 segment of the Southern Las Vegas Beltway alignment includes several exit/entrance and transition ramps, frontage roads and local road intersections in addition to the main beltway. Anticipated Design Hourly Vehicles on the various roadways range from less than 100 to several thousand vehicles per hour. In addition, the mixture of vehicle types using the system may be quite variable.

The pavement analyses for this report was based on traffic information provided by Parsons Brinckerhoff, the results of our geotechnical exploration and laboratory testing program described in this report and the 1986 American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures.(7)

Our initial analyses evaluated the Southern Las Vegas Beltway as 19 individual segments of roadway based on traffic projections and highway segments defined by Parsons Brinckerhoff and fourteen design R-values representative of test results throughout the alignment. Each segment was evaluated for both asphalt and Portland cement concrete pavement structural sections. The analyses was performed on each segment for the passenger auto and truck vehicle traffic mixtures requested.

During final analyses the pavement structural sections were combined to five pavement structural sections for the final design and construction. Alternate combinations are provided with each flexible pavement section.

6.4.2 Traffic Considerations

The primary traffic data provided for design analyses consisted of projected Design Hourly Vehicles (DHV) on a highway flow net. The information was presented in a table by Parsons Brinckerhoff. For our analyses the truck traffic was further subdivided as 50 percent single-axle vehicles with an axle load of 15 kips and 50 percent tandem-axle vehicles with an axle load of 18 kips. The design lane volume was considered to be 1500 vehicles per hour maximum.

The design lane hourly traffic was assigned as presented in Table 6.4.2-1. For our analyses the DHV was estimated as 8 percent of the Average Daily Traffic (ADT).

It is our understanding that the design hourly vehicle traffic projection include analysis for traffic growth during the 20-year design life used in our analyses. The highway segments, DHV, percent truck traffic and 20-year design 18 kip ESAL Data are presented on Table 6.4.2-1. The Design R-Value is also presented on this table.

Table 6.4.2-1
Design Traffic Data

				20 Year 18 Kip	**35 Year 8 Kip**	
				Design ESAL x10^6		
Highway Segment	**2016 DHV**	**Design Lane % Dist.**	**Percent Truck Vehicles**	**Flexible Pavement**	**Rigid Pavement**	**Design R-Value**
R-3	695	100	5	4.70	8.94	45
R-5	39/338	100	5	2.29	4.35	45
R-6	31	100	5	0.21	0.40	45
R-7	174	100	5	1.18	2.24	45
R-8	174	100	5	1.18	2.24	45
R-9	300	100	5	2.03	3.86	45
R-10	26	100	5	0.18	0.33	45
DEC W ramp	643	100	5	3.87	8.27	45
DEC E ramp	475	100	5	3.21	6.11	45
DECATUR	1143	100	5	3.87	14.7	45
VV	556	100	5	1.88	7.15	45
AE	4388	75	5	--	56.4	45
AW	4571	75	5	--	58.8	45
I-15 N	4696	75	5	--	60.4	45
I-15 S	3718	75	5	--	47.8	45

6.4.3 Geotechnical Considerations

As previously reported, fourteen (14) R-value tests were performed on representative soil samples from below the anticipated road grade elevation along the Section 6 segment. The test results are presented on Plates B-20 through B-33 in Appendix B. The R-value test results, along with sieve analyses, Atterberg limits, moisture content, density test results and the drill logs were reviewed to establish pavement subgrade design values appropriate for each segment of the highway alignment. Variability of the subgrade soil along the highway segments was considered in the analysis. The depth below design subgrade to cemented soils was considered for each segment.

The R-value test results indicate a slight trend of decreasing R-value from west to east and with increasing depth. Statistically the R-value tests group around two values (R=28 and R=60). The R-value of 28 at Borings MB-1 and MB-43 and R=83 at MB-57 are anomalies and were not directly applied in design. The average R-value for the remaining 11 tests was R=63 with a range of R=51 to 78. Final pavement designs are provided based on a design R-value of 45. Some minimal selective grading may be necessary to exclude embankment borrow soil with an R-value less than R=45. The highway alignment was assigned a drainage coefficient of 1.1 for design purposes. A resilient modulus of 11500 psi was assigned for the R=45 design value.

TABLE 6.4.3-1

Southern Beltway Section 6 R-Value Test Results

Boring No.	Depth (feet)	R-Value
MB-1	6.0	28
MB-2	0.5	53
MB-9	24	78
MB-15	25	67
MB-19	6.0	73
MB-21	30	51
MB-26	15	58
MB-30	10	68
MB-43	3.0	28
MB-45	15	60
MB-50	10	64
MB-52	5.0	53
MB-55	6.0	57
MB-57	25	83

6.4.4 Pavement Structural Sections

Based upon the traffic data provided by Parsons-Brinckerhoff and our analyses of the subgrade soil conditions along the alignment, structural pavement sections were designed in accordance with the 1986 AASHTO Guide for Design of Pavement Structures. The design life for asphalt highways was assumed to be 20-years. Rigid pavements were evaluated for a 35 year design life. A terminal serviceability index of 2.5 was selected for design. A reliability coefficient (R%) of 0.95 and a standard deviation (S_O) value of 0.45 were utilized in our design analyses for flexible pavement. A reliability coefficient (R%) of 0.95 and a standard deviation (S_o) of 0.35 were utilized in our design analyses for rigid pavements.

For design purposes, asphaltic concrete was assigned a structural coefficient of 0.35. NDOT Type I, Class A and Class B base course with a minimum R-value of 70 was assigned a structural coefficient of 0.10. Clark County Type II base course with a minimum R-value of 78 was assigned a structural coefficient of 0.12.

Concrete pavement sections were designed for Portland cement concrete (NDOT Class A, Modified, Air Entrained) having a minimum 28-day compressive strength of 4000 psi. Cement treated base with a minimum 7-day compressive strength of 450 psi was considered in the design. The thickness of NDOT Type I, Class A base course and cement treated base was designed to provide a base for the concrete pavement with a minimum modulus of subgrade reaction of 400 pci. A dowel bar load transfer coefficient of 2.8 was used in design.

Based on our analyses of the traffic projections, subgrade soil conditions and the above referenced design considerations, structural pavement sections for the Southern Beltway Section 6 Alignment are presented in Tables 6.4.4-1 through 6.4.4-5.

TABLE 6.4.4-1

RIGID PAVEMENT STRUCTURAL SECTION HIGHWAY SEGMENTS - BELTWAY AE & AW, I-15 N & S

Design Parameters

35 Year-18 kip ESAL	60.4 x 10^6
Design R-Value (R)	45
Effective Subgrade Modulus (K)	400 pci
Mean Modulus of Rupture (S^1_c)	650 psi
Load Transfer Coefficient (J)	2.8
Drainage Coefficient (C_d)	1.0
Design Serviceability Loss (PSI)	1.7

Concrete	Cement Treated Base	NDOT Type 1 Class A
11 inches	4 inches	6 inches

TABLE 6.4.4-2

RIGID PAVEMENT STRUCTURAL SECTION HIGHWAY SEGMENTS R-3, R-5, R-6, R-7, R-8, R-9, R-10, DEC

Design Parameters

35 Year-18 kip ESAL	8.94 x 10^6
Design R-Value (R)	45
Effective Subgrade Modulus (K)	400 pci
Mean Modulus of Rupture (S^1_c)	650 psi
Load Transfer Coefficient (J)	2.8
Drainage Coefficient (C_d)	1.0
Design Serviceability (PSI)	1.7

Concrete	**Cement Treated Base**	**NDOT Type 1, Class A Aggregate Base Course**
10 inches	4 inches	6 inches

TABLE 6.4.4-3

FLEXIBLE PAVEMENT STRUCTURAL SECTION HIGHWAY SEGMENTS R-3, DEC W, DEC E

Design Parameters

20 Year-18 kip ESAL	4.57 x 10^6
Design R-Value (R)	45
Effective Resilient Modulus (M_r)	11,500 psi
Design Structural Number (SN)	3.87

Asphalt Friction Course	**Asphaltic Concrete**	**NDOT Type 1, Class B Aggregate Base Course**
3/4 inch	6 inches	13 inches
3/4 inch	5 inches	17 inches

TABLE 6.4.4-4

FLEXIBLE PAVEMENT STRUCTURAL SECTION HIGHWAY SEGMENT R-5, R-6, R-7, R-8, R-9, R-10

Design Parameters

20 Year-18 kip ESAL	2.29×10^6
Design R-Value (R)	45
Effective Resilient Modulus (M_r)	11,500 psi
Design Structural Number (SN)	3.49

Asphalt Friction Course	**Asphaltic Concrete**	**NDOT Type 1, Class B Aggregate Base Course**
3/4 inch	5 inches	13 inches
3/4 inch	6 inches	10 inches

TABLE 6.4.4-5

FLEXIBLE PAVEMENT STRUCTURAL SECTION HIGHWAY SEGMENT DECATUR, VV

Design Parameters

20 Year-18 kip ESAL	3.87×10^6
Design R-Value (R)	45
Effective Resilient Modulus (M_r)	11,500 psi
Design Structural Number (SN)	3.78

Asphalt Friction Course	**Asphaltic Concrete**	**NDOT Type 1, Class B Aggregate Base Course**
3/4 inch	5 inches	16 inches
3/4 inch	6 inches	12 inches

* Temporary, detour, bypass sections, and pavements designed for a service life of 5 years or less may be constructed using a 3 inch asphalt mat over 12 inches of aggregate base course.

7.0 CLOSURE

7.1 LIMITATIONS

The conclusions and recommendations contained in this report are based on our field explorations, laboratory tests and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the 66 borings drilled along the proposed alignment for the Southern Beltway, Section 6 segment of the Las Vegas Beltway alignment. It is anticipated that some variations in the soil and groundwater conditions could exist between the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered which are different from those described in this report. In addition, if the scope of the proposed construction changes from that described in this report, our firm should be notified.

7.2 ADDITIONAL SERVICES

The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be made during construction to verify compliance with these recommendations and to permit evaluation of completed work with regard for future improvements. The tests and observations should include, but not be limited to, the following:

- Observation and testing of subgrade soils
- Observation and testing of engineered fill placement and compaction.
- Observation and testing of aggregate base course and subbase placement and compaction.
- Observation and testing of asphaltic concrete, Portland cement concrete and cement treated base placement and consolidation or compaction as appropriate.
- Consultation as may be required during construction.

We also recommend that project plans and specifications be reviewed by Kleinfelder, Inc. to verify compatibility with our conclusions and recommendations. Additional information concerning the frequency of observations and testing, scope and cost of these services can be obtained from our office.

We appreciate this opportunity to be of service on this portion of the Las Vegas Valley, Southern Beltway, Section 6 project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact our office at your convenience.

This report was prepared in accordance with generally accepted standards of practice at the time the report was written. No warranty, express or implied, is made.

8.0 REFERENCES

AASHTO Guide Specifications for Seismic Design of Highway Bridges (1983).

Nevada Bureau of Mines and Geology, Bulletin 95 by: John W. Bell (1981).

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Las Vegas Southwest Quadrangle Geologic Map by: Jonathan C. Matti and Fred Bachhuber (1985).

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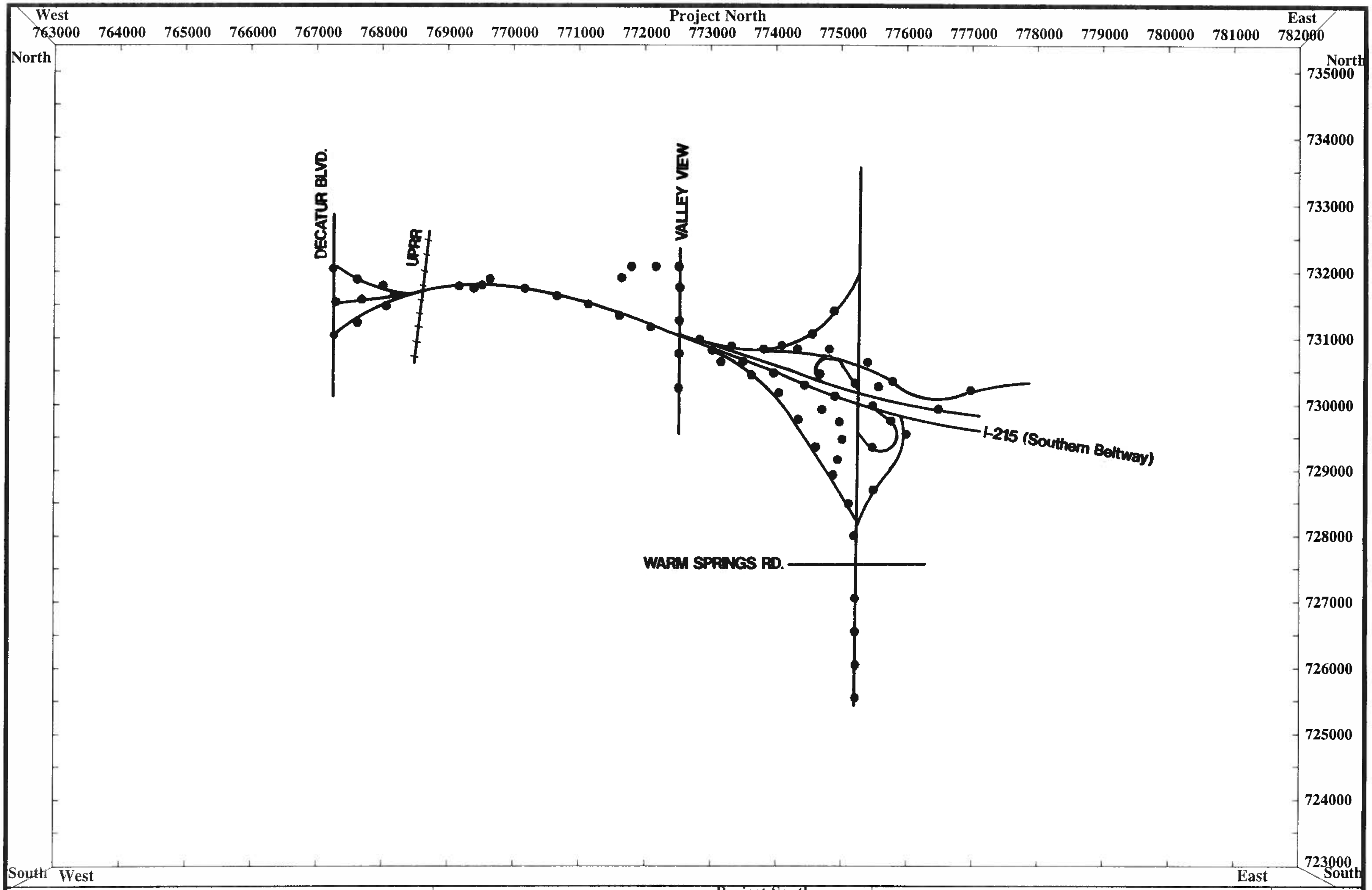
Caliche-Origin, Classification, Morphology and Uses by: C.C. Reeves, Jr. (1976).

AASHTO Guide for Design of Pavement Structures, (1986).



Project South

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

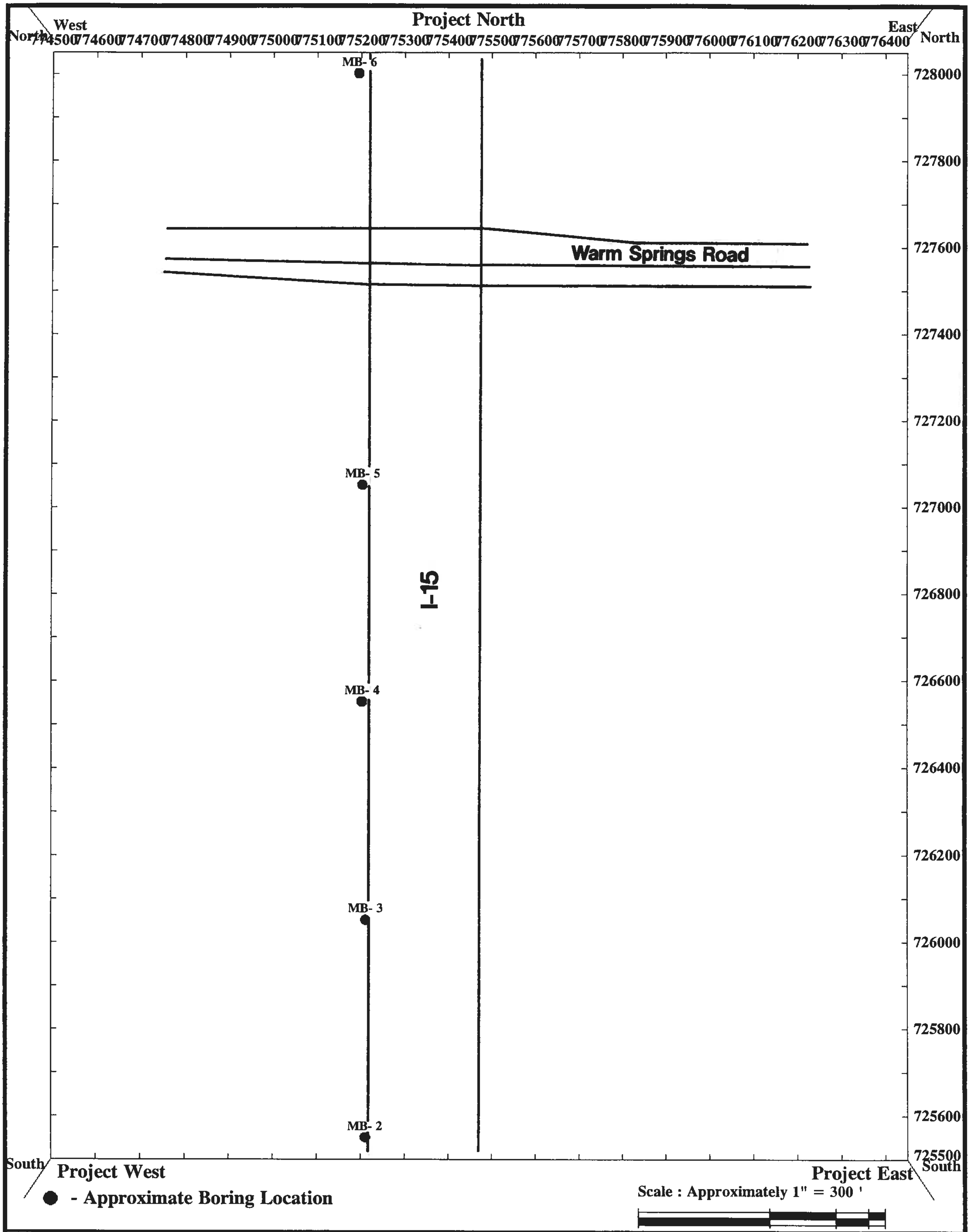
PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

GENERAL VICINITY MAP

Scale : Approximately 1" = 2000 ft.

FIGURE

1



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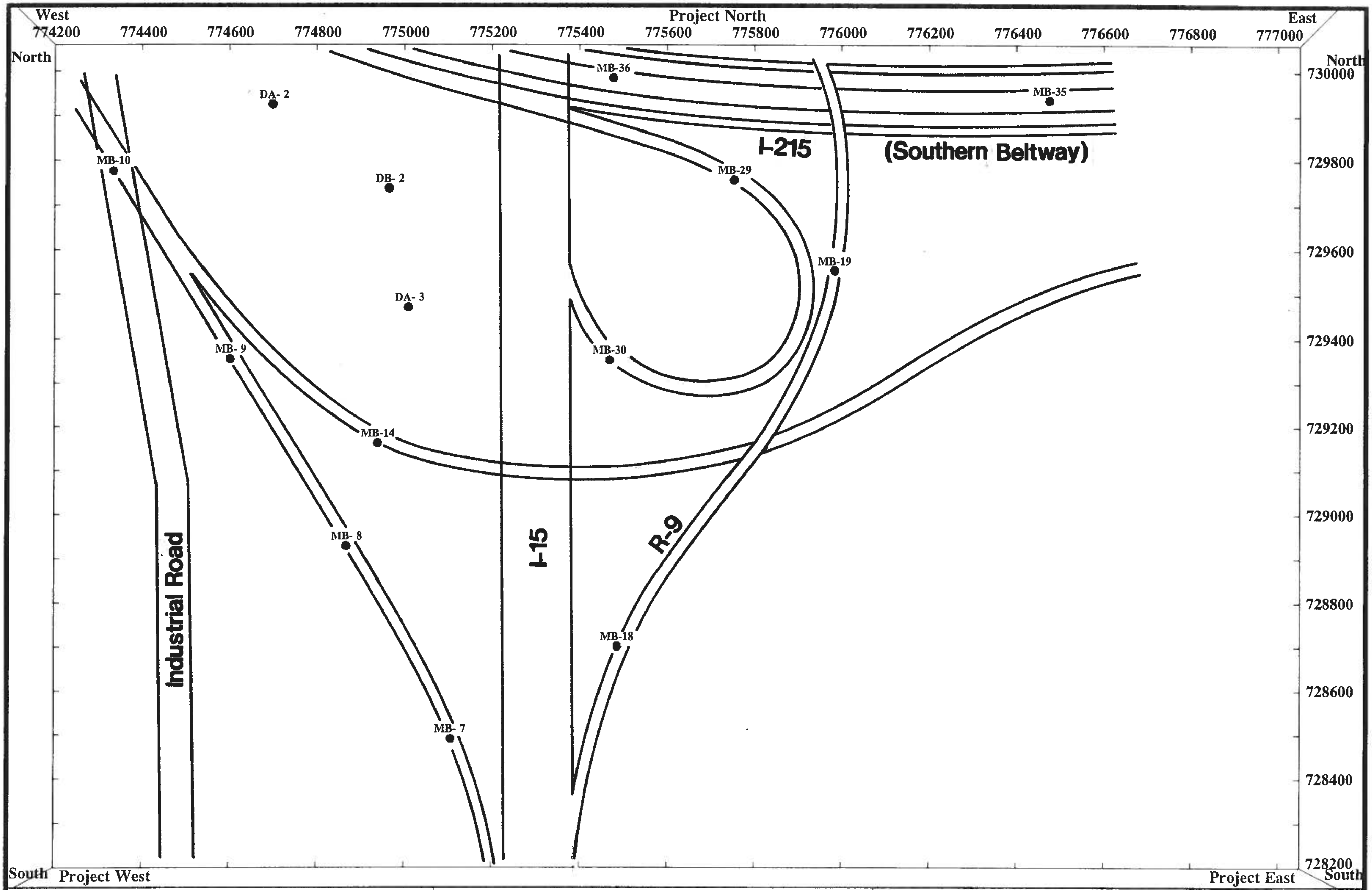
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

LOCATION OF EXPLORATIONS

FIGURE

2



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PROJECT NO. 31-215904

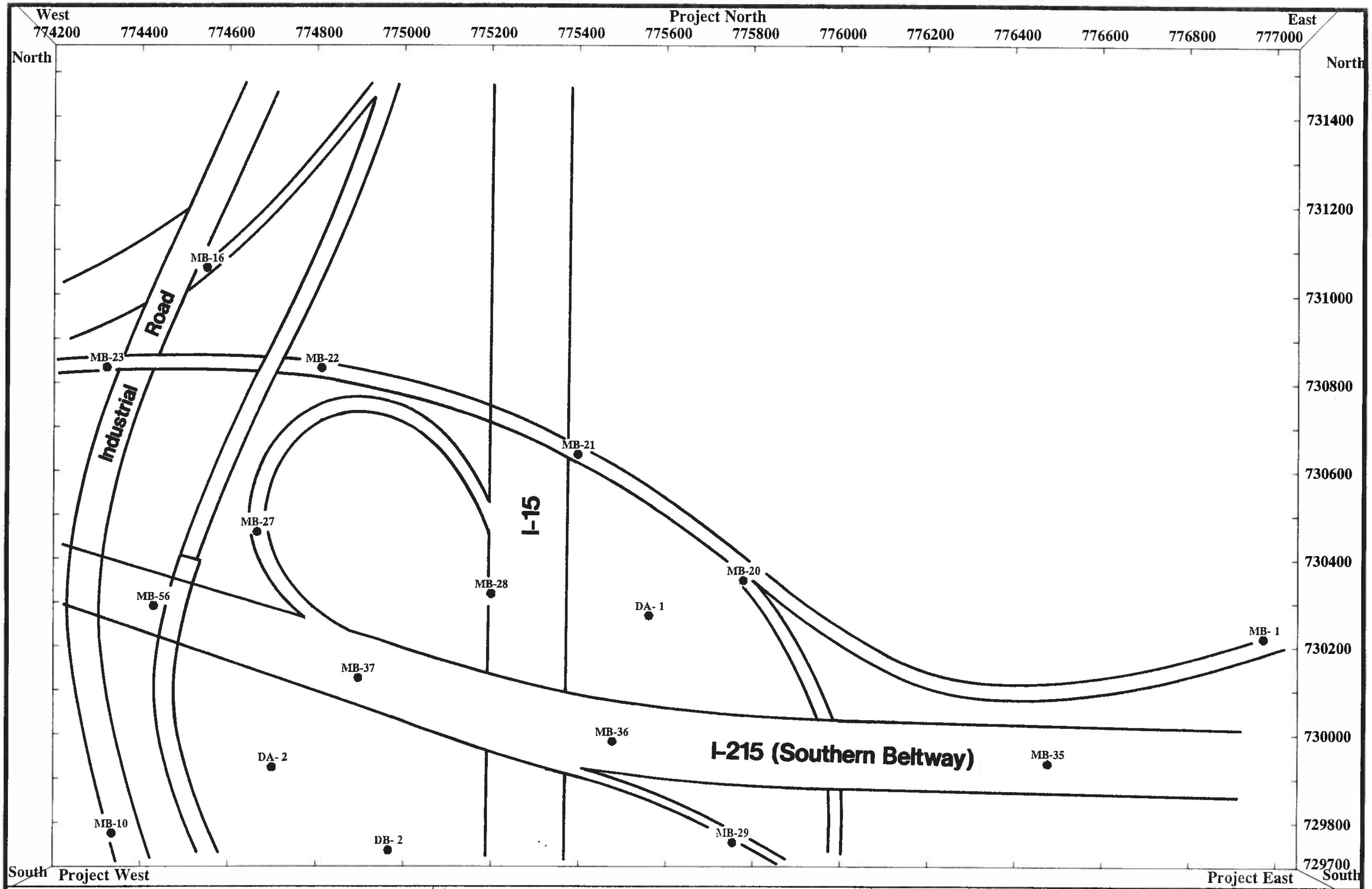
PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

LOCATION OF EXPLORATIONS

Scale : Approximately 1" = 300 ft.

● - Approximate Exploration Location

FIGURE
3



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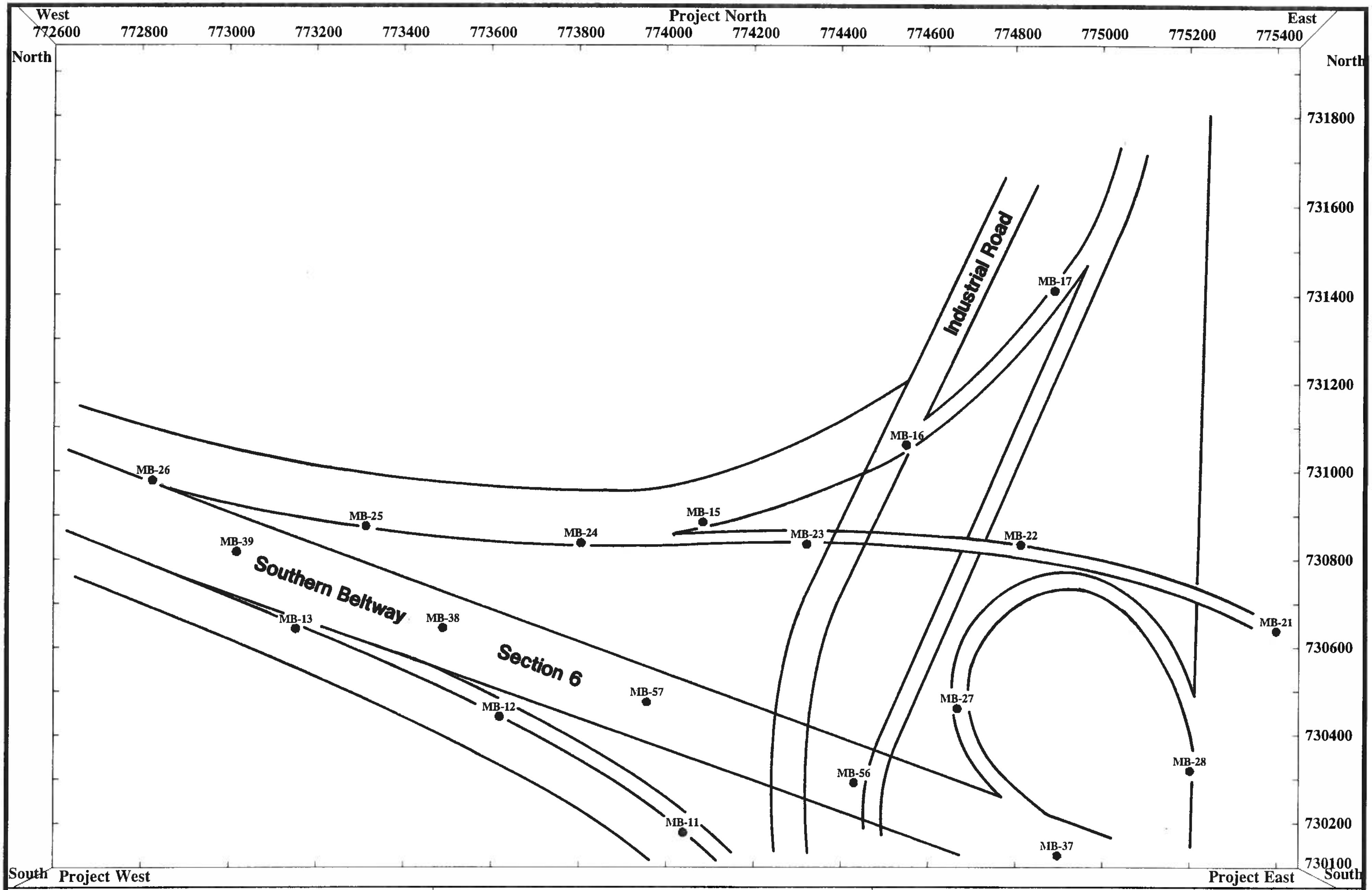
PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

LOCATION OF EXPLORATIONS

Scale : Approximately 1" = 300 ft.

● - Approximate Exploration Location

FIGURE
4



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SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

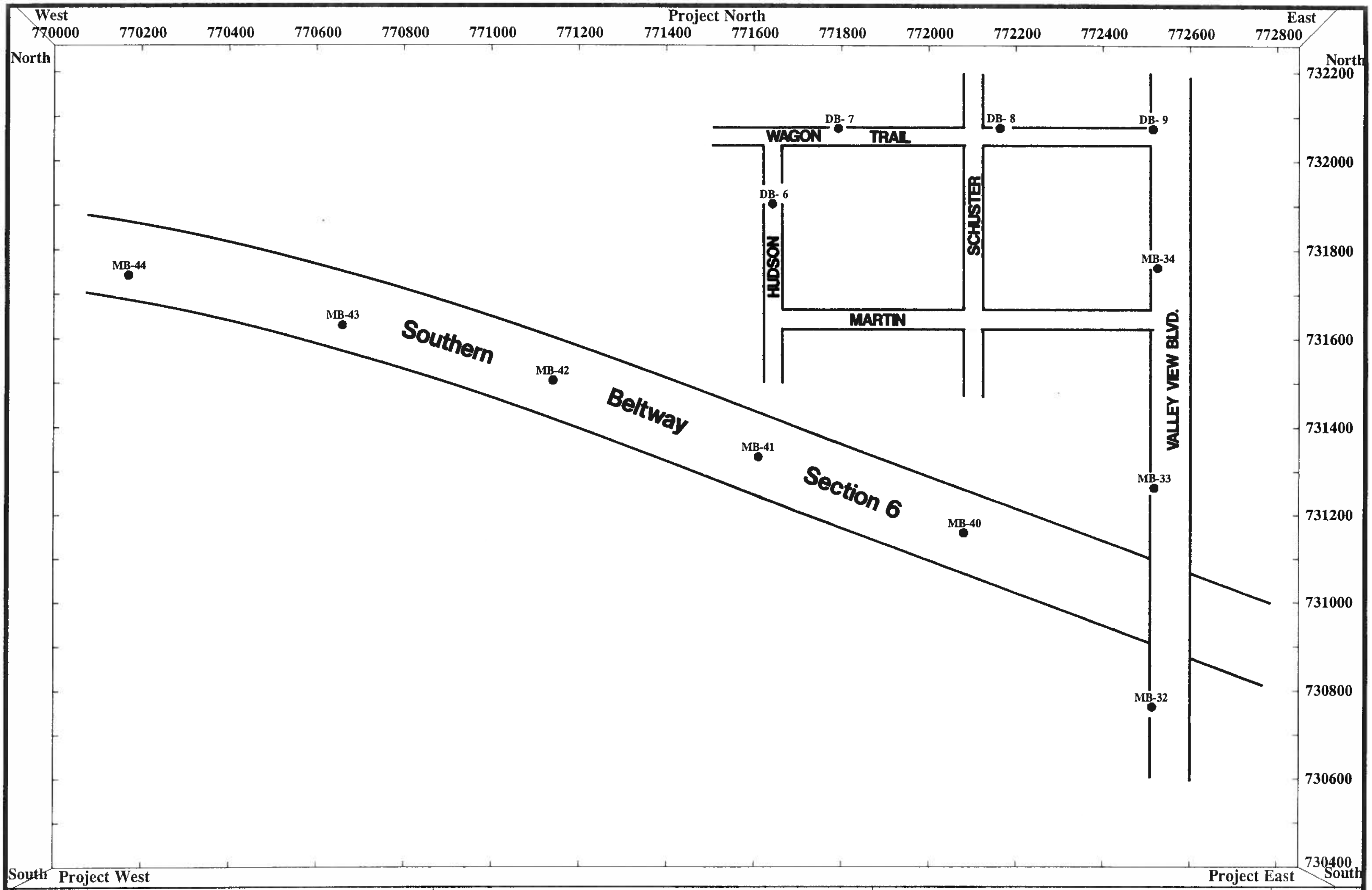
PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

LOCATION OF EXPLORATIONS

Scale : Approximately 1" = 300 ft.

● - Approximate Exploration Location

FIGURE
5



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PROJECT NO. 31-215904

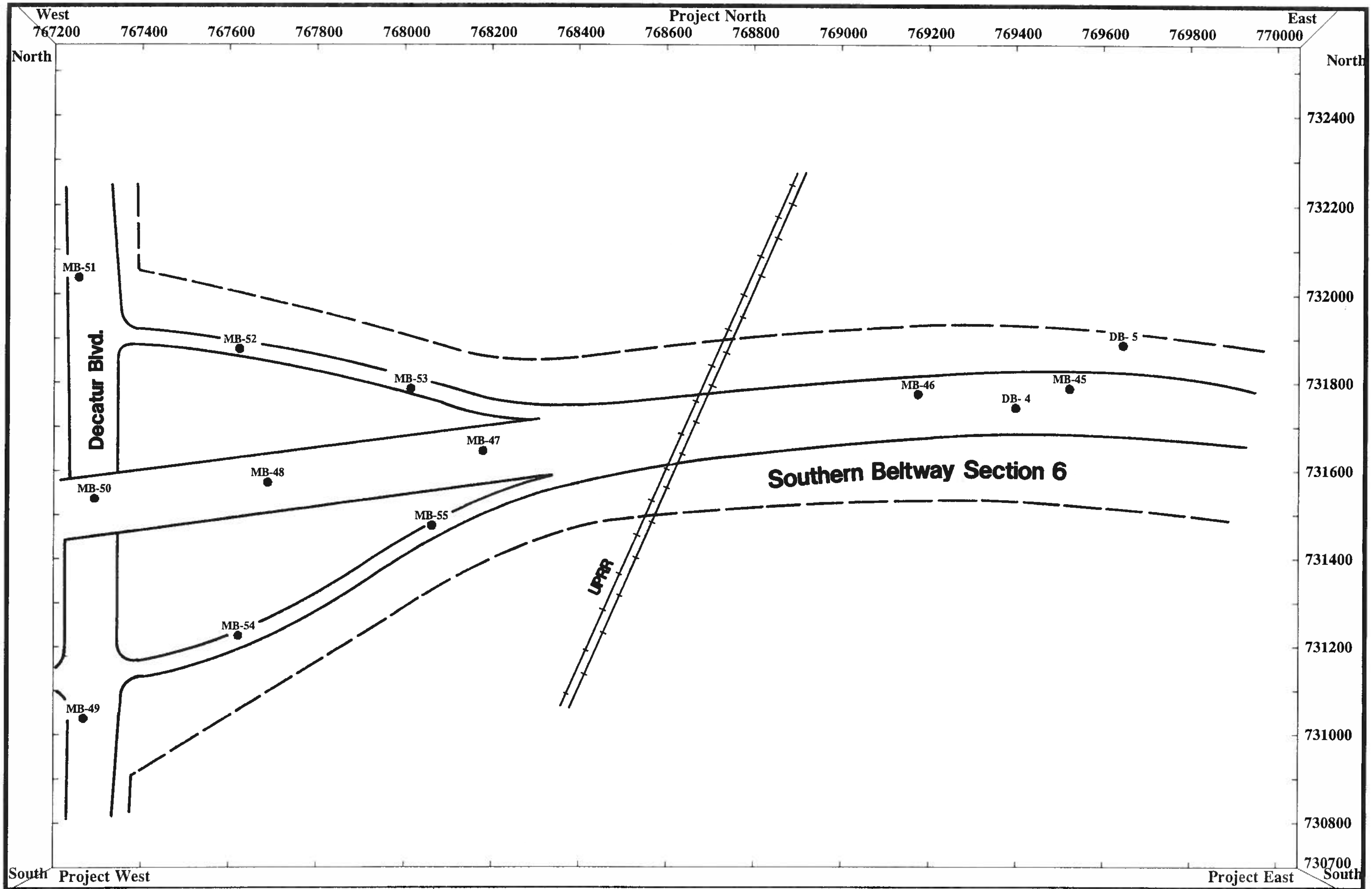
PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

LOCATION OF EXPLORATIONS

Scale : Approximately 1" = 300 ft.

● - Approximate Exploration Location

FIGURE
6



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PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

LOCATION OF EXPLORATIONS

Scale : Approximately 1" = 300 ft.

● - Approximate Exploration Location

FIGURE
7

DATE COMPLETED: 1/5/96
LOCATION: See Figures 1 through 7

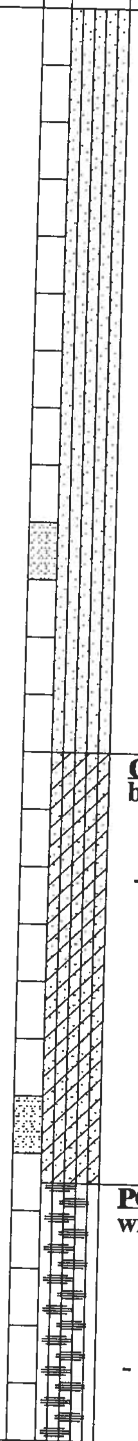
BORING NO. DA- 1

ELEVATION: 2248 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730270
Easting - 775560

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SOIL DESCRIPTION	MOISTURE	CONSIST.
2248 / 0					**SILTY SAND (SM)** - with gravel, light brown	dry	dense
					- red-yellow below 1.5 feet	slightly moist	
					- with gravel below 2.5 feet	moist	
2243 / 5							
2238 / 10	6						
					- trace clay		
					CLAYEY, SILTY SAND (SC-SM) - light brown		
2233 / 15					- partially cemented		
2228 / 20	5						
					POORLY GRADED GRAVEL (GP-GM) - with silt and sand, red-yellow		
					- partially cemented		
2223 / 25							



* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-1a

DATE COMPLETED: 1/3/96

LOCATION: See Figures 1 through 7

BORING NO. DA- 1

ELEVATION: 2248 ft.

** HAMMER WEIGHT: 140 lbs.

Northing - 730270
Easting - 775560

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2223 25									
2218 30	4						**CLAYEY, SILTY SAND (SC-SM)** - with gravel, light brown to gray	slightly moist	dense
2213 35	20			14/6 65/12					
							POORLY GRADED GRAVEL (GP) - light brown to gray - partially cemented		very dense
2208 40	1		G,A	50/1					
2203 45	8			42/6 92/11				slightly moist to moist	
							- partially cemented		
2198 50									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⊠ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

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PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-1b

DATE COMPLETED: 1/3/96
LOCATION: See Figures 1 through 7

BORING NO. DA- 1

ELEVATION: 2248 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730270 Easting - 775560 SOIL DESCRIPTION	MOISTURE	CONSIST.
2198 50	10			50/3	▤	▨			

Bottom at 50.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

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PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-1c

DATE COMPLETED: 1/6/96
LOCATION: See Figures 1 through 7

BORING NO. DA- 2

ELEVATION: 2255 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729925
Easting - 774700

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2255 / 0							**FILL** - SILTY SAND, with gravel, light brown - red-yellow below .5 feet	dry slightly moist moist	dense
							SILTY SAND (SM) - some gravel, red-yellow		
2250 / 5	4				▨				
2245 / 10					▨				
							WELL GRADED SILTY GRAVEL (GW-GM) - with sand and cobbles, red-yellow		
2240 / 15	3		G,A		▨				very dense
							SILTY SAND (SM) - with gravel, red-yellow		
2235 / 20					▨				
							CLAYEY SAND (SC) - light brown	slightly moist	
2230 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▧ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-2a

DATE COMPLETED: 1/6/96
LOCATION: See Figures 1 through 7

BORING NO. DA- 2

ELEVATION: 2255 ft.
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 729925 Easting - 774700 SOIL DESCRIPTION	MOISTURE	CONSIST.
2230 / 25	5								
							CLAYEY, SILTY SAND (SC-SM) - light brown		
2225 / 30	3			50/1			SILTY SAND (SM) - with gravel, light brown	slightly moist	very dense
							- partially cemented		
2220 / 35	1			50/1					
							CEMENTED SAND and GRAVEL - light brown		
							SILTY SAND (SM) - with gravel, light brown		
							- partially cemented		
2215 / 40	3			50/1					

Bottom at 40.5 feet.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-2b

DATE COMPLETED: 1/6/96

LOCATION: See Figures 1 through 7

BORING NO. DA- 3

ELEVATION: 2258 ft.

** HAMMER WEIGHT: 140 lbs.

Northing - 729470
Easting - 775010

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2258 / 0							**SILTY SAND (SM)** - with gravel, light brown	dry	dense
4					▒				
2253 / 5							- partially cemented		
9					▒		**CLAYEY, SILTY SAND (SC-SM)** - some gravel, light brown		
2248 / 10	2								
12							- partially cemented		
2243 / 15					▒				
2238 / 20	2				▒				
2233 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-3a

DATE COMPLETED: 1/6/96
LOCATION: See Figures 1 through 7

BORING NO. DA- 3

ELEVATION: 2258 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729470
Easting - 775010

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2233 25					░	▨			
2228 30	2		G,A, S	22/6 48/12	⋈	▨	CLAYEY, SILTY SAND (SC-SM) - cont.	dry	dense
2223 35	1			24/6 67/12	⋈	▨			very dense
					░	▨	- partially cemented		
2218 40	2		G,A	50/1		▨			

Bottom at 40.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⋈ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-3b

DATE COMPLETED: 2/13/95
LOCATION: See Figures 1 through 7

BORING NO. DB- 4

ELEVATION: 2299 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731742
Easting - 769398

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2299 0				13/12			**WELL GRADED GRAVEL (GW)** - with sand, some gravel, red-yellow	sl.moist	loose
	3	121	G,A					moist	medium dense
							- increasing gravel below 2.0 feet		dense
2294 5	2		S	50/5			- color change to light brown below 5.0 feet	dry	very dense
2289 10				50/5					
							CLAYEY SAND (SC) - with gravel, red-yellow		medium dense to dense
2284 15	6		G,A	50/3					v.dense

Bottom at 16.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-4

DATE COMPLETED: 2/15/95
LOCATION: See Figures 1 through 7

BORING NO. DB- 5

ELEVATION: 2296 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 731884 Easting - 769644 SOIL DESCRIPTION	MOISTURE	CONSIST.
2296 / 0							**SILTY SAND (SM)** - some gravel, red-yellow - some gravel to 1.0 foot - color change to yellow/brown below 1.0 foot	dry to slightly moist	loose
				12/12	▤				
	4	122					- some gravel below 2.0 feet	moist	medium dense
								slightly moist	medium dense to dense
2291 / 5	3		G,A	50/3	⧖		**CLAYEY, SILTY SAND (SC-SM)** - red-yellow		very dense
							POORLY GRADED SAND (SP-SM) - with silt and gravel, red-yellow	dry	
2286 / 10	2		S	50/3	▤				
2281 / 15	1		G,A	50/3	⧖				

Bottom at 16.0 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧖ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-5

DATE COMPLETED: 8/9/95
LOCATION: See Figures 1 through 7

BORING NO. DB- 6

ELEVATION:
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 731903 Easting - 771643 SOIL DESCRIPTION	MOISTURE	CONSIST.
0							SILTY SAND (SM) - with gravel, light brown	dry	medium dense
							- lighter brown after 3 feet	slightly moist	
							CLAYEY SAND (SC) - olive brown	moist	
5	7		G,A	11/6 34/12	⧗		SILTY, CLAYEY SAND (SC-SM) -with some gravel, light brown	slightly moist	dense
							- partially cemented		
10	5			14/6 21/12	⧗		CLAYEY SAND (SC) - with some gravel, red-brown		medium dense
							- red-yellow		
							- light brown		
15	15			8/6 19/12	⧗		SANDY CLAY (CL) - gray to white		very stiff

Bottom at 16.5 feet

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-6

DATE COMPLETED: 8/11/95
LOCATION: See Figures 1 through 7

BORING NO. DB- 7

ELEVATION:
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 732073 Easting - 771793 SOIL DESCRIPTION	MOISTURE	CONSIST.
0							**SILTY SAND (SM)** - fine grained, strongly cemented, light brown	dry	medium dense
							CLAYEY SAND (SC) - partially cemented, olive brown	slightly moist	very dense
							- with gravel after 3 feet, light brown		
5	2			15/6 50/5	⧗				
10	6		G,A	24/6 79/12	⧗		- partially cemented, gray to white		
							- color change to light brown		
15	5			12/6 55/12	⧗		- moderately cemented, with gravel, red-brown		

Bottom at 16.5 feet

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-7

DATE COMPLETED: 8/11/95
LOCATION: See Figures 1 through 7

BORING NO. DB- 8

ELEVATION:
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 732074 Easting - 772163 SOIL DESCRIPTION	MOISTURE	CONSIST.
0							**POORLY GRADED GRAVEL (GP)**	dry	dense
							SILTY SAND (SM) - with gravel, light brown		
							CLAYEY SAND (SC) - with gravel, gray to white	slightly moist	
									very dense
							- olive green to brown		
5	5		G,A	15/6 78/12	⧓				
							- light brown		
							CLAYEY SILT (ML) - with sand, strongly cemented, off-white		very stiff to hard
							CLAYEY SAND (SC) - red-brown		very dense
10	2			13/6 51/12	⧓				
							- olive brown		
15	5			29/6 58/12	⧓		- some gravel, light brown		
							Bottom at 16.5 feet		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧓ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-8

DATE COMPLETED: 8/11/95
LOCATION: See Figures 1 through 7

BORING NO. DB- 9

ELEVATION:
** HAMMER WEIGHT: 140 lbs.

Northing - 732072
Easting - 772514

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
0							**SILTY SAND (SM)** - with gravel, light brown	dry	medium dense
							CLAYEY SAND (SC) - light brown - - partially cemented	slightly moist	dense
5	3		G,A	23/6 75/12			**SILTY SAND (SM)** - reddish brown		very dense
							CLAYEY SAND (SC) - light brown		
10	6			13/6 49/12			- red-brown		dense
							- some gravel, olive brown		very dense
							- light brown		
15	6			26/6 92/12					

Bottom at 16.5 feet

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⊠ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-9

DATE COMPLETED: 2/24/93
LOCATION: See Figures 1 through 7

BORING NO. MB- 1

ELEVATION: 2229 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730219
Easting - 776971

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2229 / 0							SILTY SAND (SM) - with gravel, light brown	dry	dense
2224 / 5				73/12	▤				very dense
	3	90	G,A,R						
							Bottom at 6.5 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ‖ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-10

DATE COMPLETED: 5/16/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 2

ELEVATION: 2264 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 725551 Easting - 775211 SOIL DESCRIPTION	MOISTURE	CONSIST.
2264 0			R		▨		**SILTY SAND (SM)** - with gravel, light brown	slightly moist	dense
			G,A						
2259 5							Bottom at 5.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-11

DATE COMPLETED: 4/6/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 3

ELEVATION: 2263 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 726051 Easting - 775212 SOIL DESCRIPTION	MOISTURE	CONSIST.
2263 0					▒		GRAVELLY SAND (SP-SM) - with silt, light brown	slightly moist	dense
					▒	▨	CLAYEY SAND (SC) - light brown		
		G,A			▒	▥	SILTY SAND (SM) - red-yellow		
2258 5							Bottom at 5.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-12

DATE COMPLETED: 4/6/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 4

ELEVATION: 2262 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 726552 Easting - 775204 SOIL DESCRIPTION	MOISTURE	CONSIST.
2262 / 0					▒		**GRAVELLY SAND (SP-SM)** - with silt, light brown - brown	slightly moist	dense
			G,A		▒	▥	**SILTY SAND (SM)** - light brown		
2257 / 5							Bottom at 5.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-13

DATE COMPLETED: 4/6/95

LOCATION: See Figures 1 through 7

BORING NO. MB- 5

ELEVATION: 2260 ft.

** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 727051 Easting - 775205 SOIL DESCRIPTION	MOISTURE	CONSIST.
2260 / 0					▨		**SILTY SAND (SM)** - with gravel, light brown	slightly moist	dense
			G,A		▨				
2255 / 5							Bottom at 5.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ||| Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-14

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 6

ELEVATION: 2258 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 728001
Easting - 775194

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2258 / 0					░		SILTY SAND (SM) - some gravel, light brown and yellow-brown	slightly moist to moist	medium dense
2253 / 5	4	96		31/12	▤		SANDY GRAVEL (GM) - with silt, light brown and yellow-brown		dense

Bottom at 6.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⌧ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-15

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 7

ELEVATION: 2258 ft.
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

Northing - 728491
Easting - 775107

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2258 / 0							**SILTY SAND (SM)** - some gravel, light brown and yellow/brown	slightly moist	dense
2253 / 5				79/12	▤			slightly moist to moist	very dense
	2	108							
2248 / 10	0		G,A	84/12	⧖				

Bottom at 11.0 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧖ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-16

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 8

ELEVATION: 2257 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 728928 Easting - 774869 SOIL DESCRIPTION	MOISTURE	CONSIST.
2257 / 0					░		**SILTY SAND (SM)** - some gravel, light brown and yellow-brown	slightly moist	dense
2252 / 5				52/12	▤				
	2	115					**SANDY GRAVEL (GM)** - with silt, some gravel, light brown and yellow-brown	slightly moist to moist	
2247 / 10				48/12	⧗				
	1							moist	
2242 / 15				50/3	▤				v.dense

Bottom at 15.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-17

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 9

ELEVATION: 2262 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729354
Easting - 774603

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2262 / 0					▒		**SILTY SAND (SM)** - light brown and yellow-brown	slightly moist to moist	medium dense
									dense
2257 / 5				53/12	▤				very dense
	2	106					- partially cemented pieces		
2252 / 10	1			30/12	⧗				
							- some gravel		medium dense to dense
							- some gravel 12.0 to 13.0 feet		
2247 / 15				50/5	▤		- color change to red-brown with some gravel below 15.0 feet		very dense
2242 / 20				59/12	⧗			slightly moist	
	4								
			R				**SANDY GRAVEL (GM)** - with silt, some gravel, yellow-brown		
2237 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-18a

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB- 9

ELEVATION: 2262 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 729354 Easting - 774603 SOIL DESCRIPTION	MOISTURE	CONSIST.
2237 25				30/1	▤			sl.moist	v.dense
							Bottom at 25.5 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▨ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-18b

DATE COMPLETED: 3/4/93
LOCATION: See Figures 1 through 7

BORING NO. MB-10

ELEVATION: 2266 ft.
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

Northing - 729775
Easting - 774335

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2265 / 0					░		**SILTY SAND (SM)** - some gravel, light brown	moist	dense
2260 / 5				36/12	▤			slightly moist	
	3	93					- partially cemented		
2255 / 10				51/12	⧗				very dense
							- gravel between 10.5 and 11.0 feet		
2250 / 15				50/3	▤				
							- some gravel between 16.0 and 18.0 feet		
2245 / 20	2			72/12	⧗				
2240 / 25									

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-19a

DATE COMPLETED: 3/4/93
LOCATION: See Figures 1 through 7

BORING NO. MB-10

ELEVATION: 2266 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729775
Easting - 774335

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2240 / 25				50/3	▤		**SANDY GRAVEL (GM)** - with silt, brown	slightly moist	very dense
2235 / 30				50/2	▤				

Bottom at 30.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▨ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-19b

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB-11

ELEVATION: 2266 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730179
Easting - 774038

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2266 / 0					░		**SILTY SAND (SM)** - some gravel, light brown and yellow-brown	moist	medium dense
2261 / 5				23/12	▤				
	10	102							
							SANDY GRAVEL (GM) - with silt, brown		dense
2256 / 10	2			41/12	⧗				
2251 / 15	3	100		99/11	▤				very dense
2246 / 20	0			50/5	⧗				

Bottom at 20.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-20

LOCATION: See Figures 1 through 7

BORING NO. MB-12

** HAMMER WEIGHT: 140 lbs.

Northing - 730442
Easting - 773619

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2265 / 0					░		**SILTY SAND (SM)** - light brown and yellow-brown	slightly moist to moist	medium dense
							SANDY GRAVEL (GM) - with silt, light brown	moist	dense
2260 / 5				50/12	▤				
	2	123							
									very dense
2255 / 10				89/11	⧗				
2250 / 15	10	105	G,A	79/11	⧗		**SILTY SAND (SM)** - some gravel, light brown		

Bottom at 16.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-21

DATE COMPLETED:
LOCATION: See Figures 1 through 7

BORING NO. MB-13

ELEVATION: 2266 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730642
Easting - 773154

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2266 / 0					Bulk		**SILTY SAND (SM)** - some gravel, light brown	slightly moist	dense
				40/12	SPT				
2261 / 5	4	104		58/12	Ca. S.S.		- some salts		
							SILTY CLAY (CL) - yellow-brown	moist	hard
2256 / 10	6								
							SANDY GRAVEL (GM) - with silt, some gravel, yellow-brown		dense
2251 / 15				40/12	Ca. S.S.		**SILTY SAND (SM)** - yellow-brown		
	15	103							
2246 / 20				41/12	SPT				
2241 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▨ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-22a

LOCATION: See Figures 1 through 7

BORING NO. MB-13

** HAMMER WEIGHT: 140 lbs.

Northing - 730642
Easting - 773154

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2241 25	6	104		49/12	▤		**SILTY SAND (SM)** - cont. - some gravel below 25.0 feet	moist	dense
2236 30				86/11	⊠				very dense

Bottom at 31.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⊠ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-22b

DATE COMPLETED: 3/5/95
LOCATION: See Figures 1 through 7

BORING NO. MB-14

ELEVATION: 2260 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729162
Easting - 774940

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SOIL DESCRIPTION	MOISTURE	CONSIST.
2260 / 0						**SANDY GRAVEL (GM)** - with silt, light brown	slightly moist to moist	dense
						SILTY SAND (SM) - yellow-brown	slightly moist	very dense
2255 / 5				65/12	▤			
	2	91						
2250 / 10				98/11	⧗	- color change to red-brown 10.0 to 15.0 feet		
2245 / 15				50/1	▤	- color change to yellow-brown, some gravel below 15.0 feet		
						CLAYEY SAND (SC) - partially cemented, light brown		
2240 / 20				80/11	⧗			
	4							
						SANDY GRAVEL (GM) - with silt, light brown		
2235 / 25								

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-23a

DATE COMPLETED: 3/5/95
LOCATION: See Figures 1 through 7

BORING NO. MB-14

ELEVATION: 2260 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729162
Easting - 774940

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2235 25	2			50/1			**SANDY GRAVEL (GM)** - cont.	slightly moist	very dense
2230 30				50/1					

Bottom at 30.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ☐ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-23b

LOCATION: See Figures 1 through 7

BORING NO. MB-15

** HAMMER WEIGHT: 140 lbs.

Northing - 730884
Easting - 774083

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2256 / 0						░	**SILTY SAND (SM)** - with gravel, light brown	slightly moist	medium dense
2251 / 5				12/6 47/12	⧗	░			dense
2246 / 10	1	127		37/6 50/6	▤	░	- color change to yellow-brown below 10.0 feet		very dense
2241 / 15				31/6 50/5	⧗	░			
2236 / 20	4			50/3	▤	░			
							POORLY GRADED GRAVEL (GP-GM) - with silt and sand, light brown		
2231 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-24a

DATE COMPLETED: 2/25/95
LOCATION: See Figures 1 through 7

BORING NO. MB-15

ELEVATION: 2256 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730884 Easting - 774083 SOIL DESCRIPTION	MOISTURE	CONSIST.
2231 25	3		A,G, R	50/3	▨		**POORLY GRADED GRAVEL (GP-GM)** - cont.	slightly moist	very dense
							Bottom at 28.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-24b

DATE COMPLETED: 2/23/95
LOCATION: See Figures 1 through 7

BORING NO. MB-16

ELEVATION: 2249 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731059
Easting - 774549

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2249 / 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	loose
2244 / 5				93/12	▤		- color change to light brown 5.0 to 10.0 feet		
	1	136							very dense
									dense
2239 / 10	2			56/12	⧗				
							- partially cemented		
2234 / 15				96/11	▤				very dense
2229 / 20	7			50/6	⧗		**GRAVELLY SAND (SP)** - light brown		
2224 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-25a

DATE COMPLETED: 2/25/95
LOCATION: See Figures 1 through 7

BORING NO. MB-16

ELEVATION: 2249 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 731059 Easting - 774549 SOIL DESCRIPTION	MOISTURE	CONSIST.
2224 25	1			50/2	▤	░	GRAVELLY SAND (SP) - light brown	sl.moist	v.dense
							Bottom at 25.5 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▣ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-25b

DATE COMPLETED: 3/8/95
LOCATION: See Figures 1 through 7

BORING NO. MB-17

ELEVATION: 2244 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731410
Easting - 774888

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2244 / 0						▨	**CLAYEY SAND (SC)** - brown	slightly moist	medium dense
						▨	- some fine gravel		
2239 / 5	11			25/12	⧗	▨			
2234 / 10	8	102	G,A	50/5	▤	▨			

Bottom at 11.0 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-26

DATE COMPLETED: 2/9/95
LOCATION: See Figures 1 through 7

BORING NO. MB-18

ELEVATION: 2253 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 728701
Easting - 775486

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2253 / 0							**SILTY SAND (SM)** - with gravel, light brown	slightly moist	loose
	3	107		37/12	▤				dense
2248 / 5				42/12	▤				
	2	104	G,A						

Bottom at 6.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⊠ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-27

DATE COMPLETED: 2/13/95
LOCATION: See Figures 1 through 7

BORING NO. MB-19

ELEVATION: 2248 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 729553 Easting - 775984 SOIL DESCRIPTION	MOISTURE	CONSIST.
2247 / 0							SILTY SAND (SM) - with gravel, brown	slightly moist	medium dense
									very stiff
2242 / 5				29/12	▤				dense
			R						

Bottom at 6.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-28

DATE COMPLETED: 2/24/95
LOCATION: See Figures 1 through 7

BORING NO. MB-20

ELEVATION: 2242 ft.
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

Northing - 730351
Easting - 775778

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2242 / 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	medium dense
							SANDY CLAY (CL) - with gravel, light brown		
2237 / 5	3			50/5	▤				hard
							CLAYEY SAND (SC) - light brown		very dense
2232 / 10	4			50/4	▤				
2227 / 15	5		G,A	50/4	▤				

Bottom at 15.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-29

LOCATION: See Figures 1 through 7

BORING NO. MB-21

** HAMMER WEIGHT: 140 lbs.

Northing - 730638
Easting - 775397

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2245 / 0						▨	**CLAYEY SAND (SC)** - light brown	slightly moist	medium dense
							- color change to brown below 4.0 feet		
2240 / 5				39/12	▤		- partially cemented		dense
2235 / 10				40/12	⧗				
						▨	**SANDY CLAY (CL)** - moderately cemented, brown		hard
2230 / 15				44/12	▤	▨	**CLAYEY SAND (SC)** - brown		dense
2225 / 20				50/4	⧗		- color change to brown with gravel below 20.0 feet		very dense
2220 / 25									

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ▌ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-30a

DATE COMPLETED: 2/24/95
LOCATION: See Figures 1 through 7

BORING NO. MB-21

ELEVATION: 2245 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730638 Easting - 775397 SOIL DESCRIPTION	MOISTURE	CONSIST.
2220 25				83/12	▤	▨	**CLAYEY SAND (SC)** - cont.	slightly moist	very dense
2215 30			R	50/5	⌧	▨			

Bottom at 31.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⌧ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-30b

DATE COMPLETED: 2/23/95
LOCATION: See Figures 1 through 7

BORING NO. MB-22

ELEVATION: 2249 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730833
Easting - 774811

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2249 / 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	medium dense
2244 / 5				29/12			- partially cemented		dense
2239 / 10				50/6			- color change to light brown below 10.0 feet		very dense
2234 / 15	4			50/3					
2229 / 20				50/3					
2224 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-31a

DATE COMPLETED: 2/23/95 **BORING NO. MB-22** ELEVATION: 2249 ft.

LOCATION: See Figures 1 through 7 ** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730833 Easting - 774811 SOIL DESCRIPTION	MOISTURE	CONSIST.
2224 25				50/5	▨	▨	**CLAYEY SAND (SC)** - cont.	sl.moist	v.dense
							Bottom at 25.5 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▨ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-31b

DATE COMPLETED: 2/25/95
LOCATION: See Figures 1 through 7

BORING NO. MB-23

ELEVATION: 2254 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730834
Easting - 774321

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2254 / 0							**CLAYEY SAND (SC)** - with gravel, light brown	slightly moist	medium dense
									dense
2249 / 5				100/11					very dense
	2	131							
							- moderately cemented		
2244 / 10				50/5					
2239 / 15				50/4					
	5	100							
2234 / 20				50/6					
2229 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-32a

DATE COMPLETED: 2/23/95
LOCATION: See Figures 1 through 7

BORING NO. MB-23

ELEVATION: 2254 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730834 Easting - 774321 SOIL DESCRIPTION	MOISTURE	CONSIST.
2229 25	4			50/5	☰	▨	**CLAYEY SAND (SC)** - cont.	sl.moist	v.dense
							Bottom at 25.5 feet.		

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ☰ Ca. S.S. Sample 1.925" I. D. ⌧ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-32b

DATE COMPLETED: 2/23/95
LOCATION: See Figures 1 through 7

BORING NO. MB-24

ELEVATION: 2260 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730836
Easting - 773805

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2260 / 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	medium dense
2255 / 5				36/12	▤				dense
	7	99							
							- color change to light brown below 7.0 feet		
2250 / 10				50/5	▤				very dense
							SILTY SAND (SM) - with gravel, brown		
2245 / 15				75/12	▤				
	6	110	G,A						
2240 / 20	5			50/3	▤				

Bottom at 20.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-33

DATE COMPLETED: 2/23/95
LOCATION: See Figures 1 through 7

BORING NO. MB-25

ELEVATION: 2262 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730875
Easting - 773315

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2262 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	medium dense
							- color change to light brown below 4.0 feet		
2257 5				52/12					dense
									very dense
2252 10	4	107		77/12					
2247 15	3			50/3					
2242 20				40/12					

Bottom at 21.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-34

DATE COMPLETED: 3/7/95
LOCATION: See Figures 1 through 7

BORING NO. MB-26

ELEVATION: 2269 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730978
Easting - 772826

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2269 / 0							**SILTY SAND (SM)** - light brown	slightly moist	medium dense
							- color change to yellow-brown 2.0 to 4.0 feet		
2264 / 5	4	93		99/10	▤				very dense
							- color change to brown 8.0 to 11.5 feet		
2259 / 10				96/9	⧗				
	3		G,A,R	100/11	▤		- with gravel		
2254 / 15							Bottom at 15.0 feet.		

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-35

DATE COMPLETED: 2/25/93
LOCATION: See Figures 1 through 7

BORING NO. MB-27

ELEVATION: 2254 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730460
Easting - 774666

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2254 / 0						▨	**CLAYEY SAND (SC)** - partially cemented, brown	slightly moist	medium dense
2249 / 5	3	69		50/5	▤	▨			very dense
						▨	- color change to light brown, moderately cemented below 6.0 feet		
2244 / 10	3		G,A	50/5	⧗	░	**SILTY SAND (SM)** - light brown		
						░	- with gravel below 12.5 feet		
2239 / 15				50/5	▤	░			
2234 / 20	3			50/5	⧗	░			

Bottom at 20.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-36

LOCATION: See Figures 1 through 7

BORING NO. MB-28

** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730319 Easting - 775200 SOIL DESCRIPTION	MOISTURE	CONSIST.
2250 0							**SILTY SAND (SM)** - with gravel, light brown - yellow-brown	slightly moist	very dense
			G,A						
2245 5							Bottom at 5.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-37

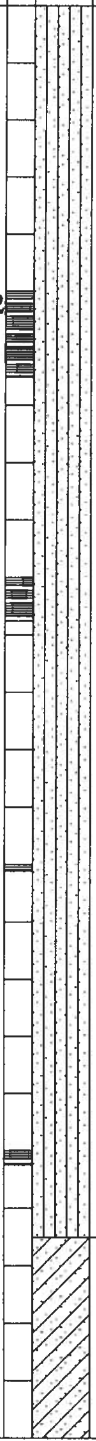
DATE COMPLETED: 2/13/95
LOCATION: See Figures 1 through 7

BORING NO. MB-29

ELEVATION: 2251 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729756
Easting - 775754

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SOIL DESCRIPTION	MOISTURE	CONSIST.
2251 / 0					**SILTY SAND (SM)** - with gravel, brown	slightly moist	loose
							medium dense
2246 / 5				33/12	- no gravel 5.0 to 10.0 feet		
	2	100					
							very dense
2241 / 10	1	106		50/3			
2236 / 15				50/1			
2231 / 20	2			50/3			
					CLAYEY SAND (SC) - with gravel, light brown		hard
2226 / 25							



THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▣ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-38a

DATE COMPLETED: 2/13/95
LOCATION: See Figures 1 through 7

BORING NO. MB-29

ELEVATION: 2251 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 729756 Easting - 775754 SOIL DESCRIPTION	MOISTURE	CONSIST.
2226 25	4		G,A	50/1		▨	**CLAYEY SAND (SC)** - cont.	sl.moist	hard
							Bottom at 25.5 feet.		

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-38b

DATE COMPLETED: 2/15/95
LOCATION: See Figures 1 through 7

BORING NO. MB-30

ELEVATION: 2255 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729352
Easting - 775469

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2255 / 0						▨	**SILTY SAND (SM)** - with gravel, brown	slightly moist	medium dense
							- moderately cemented below 4.0 feet		
2250 / 5				27/12	▤				
	7	103							
									very dense
2245 / 10	3	106	R	50/4	▤				
2240 / 15							Bottom at 15.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-39

LOCATION: See Figures 1 through 7

BORING NO. MB-31

** HAMMER WEIGHT: 140 lbs.

Northing - 730248
Easting - 772506

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2274 / 0							**SANDY GRAVEL (GM)** - some grvel, yellow-brown	slightly moist to moist	dense
							CLAYEY SAND (SC) - partially cemented, yellow-brown and light brown	moist	
2269 / 5				48/12					
	8	107							
							- some gravel 8.0 to 8.5 feet		
2264 / 10				51/12					very dense
							- trace gravel below 11.0 feet		

Bottom at 11.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-40

DATE COMPLETED: 3/3/93
LOCATION: See Figures 1 through 7

BORING NO. MB-32

ELEVATION: 2270 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730764
Easting - 772512

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2270 / 0							**SANDY GRAVEL (GM)** - with silt, some gravel, light rown and yellow-brown	slightly moist	dense
							SILTY SAND (SM) - light brown and white	moist	medium dense
							- color change to light brown and yellow-brown		
2265 / 5				30/12					
	3	98							
							- some gravel 8.0 to 8.5 feet		
							- color change to white, partially cemented below 9.0 feet	slightly moist	very dense
2260 / 10				88/12					
2255 / 15				86/12					

Bottom at 16.0 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-41

DATE COMPLETED: 3/5/95
LOCATION: See Figures 1 through 7

BORING NO. MB-33

ELEVATION: 2269 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731262
Easting - 772517

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2269 / 0					▒		**SANDY GRAVEL (GM)** - with silt, some gravel and cobbles, yellow-brown	slightly moist moist	dense
							CLAYEY SAND (SC) - white		medium dense
2264 / 5				52/12	▤				
							SANDY GRAVEL (GM) - with silt, some gravel, yellow-brown		dense
							SILTY SAND (SM) - partially cemented, light brown	slightly moist	very dense
2259 / 10				75/12	⧗				
							SANDY GRAVEL (GM) - some gravel, light brown		
2254 / 15				50/6	▤			moist	

Bottom at 15.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-42

DATE COMPLETED: 2/13/93
LOCATION: See Figures 1 through 7

BORING NO. MB-34

ELEVATION: 2266 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731760
Easting - 772525

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2266 / 0							**SILTY SAND (SM)** - little gravel, light brown	dry to slightly moist	medium dense
				47/12	⧗		- color change to yellow/brown below 2.0 feet		
					⧗		**CLAYEY SAND (SC)** - light brown and gray	dry	dense
							SANDY CLAY (CL) - light brown and red-brown		hard
2261 / 5				78/12	▤				
	5	101	G,A						
							SILTY SAND (SM) - light brown and red-brown		medium dense
2256 / 10	3			56/12	⧗				
					⧗		**CLAYEY SAND (SC)** - light brown and red-brown		dense

Bottom at 11.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-43

DATE COMPLETED: 2/13/95

LOCATION: See Figures 1 through 7

BORING NO. MB-35

ELEVATION: 2239 ft.

** HAMMER WEIGHT: 140 lbs.

Northing - 729934
Easting - 776475

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2239 / 0						░	**SILTY SAND (SM)** - with gravel, light brown	dry	loose
								slightly moist	stiff
						▨	**SILTY CLAY (CL)** - light brown	moist	
2234 / 5				93/12	▤	░	**SILTY CLAY (CL)** - moderately cemented, light brown	slightly moist	very dense
	5	107							
2229 / 10	3			50/5	▤				
2224 / 15				80/12	▤	▨	**SANDY CLAY (CL)** - with gravel, moderately cemented, light brown		hard
	5	108							
2219 / 20				50/6	▤	▨	**CLAYEY SAND (SC)** - moderately cemented, light brown		very dense
							- partially cemented		hard
2214 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▣ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO.31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE

A-44a

DATE COMPLETED: 2/13/95
LOCATION: See Figures 1 through 7

BORING NO. MB-35

ELEVATION: 2239 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 729934 Easting - 776475 SOIL DESCRIPTION	MOISTURE	CONSIST.
2214 25	8	105	G,A	83/12	▤	▨	**CLAYEY SAND (SC)** - cont.	slightly moist	hard
2209 30							Bottom at 30.0 feet.		

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-44b

DATE COMPLETED: 2/14/95
LOCATION: See Figures 1 through 7

BORING NO. MB-36

ELEVATION: 2247 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 729984
Easting - 775477

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2247 / 0							**SILTY SAND (SM)** - light brown	slightly moist	loose
2242 / 5	5	113		10/6 20/12	▤				medium dense
							- some gravel at 6.0 feet		
2237 / 10				29/6 76/12	▤				very dense
	6	119					**CLAYEY SAND (SC)** - with gravel, red-brown		
2232 / 15				50/1	▤				
2227 / 20				50/2	▤		**SILTY SAND (SM)** - with gravel, brown		
	3								
2222 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-45a

DATE COMPLETED: 2/14/95
LOCATION: See Figures 1 through 7

BORING NO. MB-36

ELEVATION: 2247 ft.
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 729984 Easting - 775477 SOIL DESCRIPTION	MOISTURE	CONSIST.
2222 25	6			50/5	▤		SILTY SAND (SM) - cont. - trace clay at 25.0 feet	slightly moist	very dense
2217 30	5	106	R	27/6 50/6	░				

Bottom at 31.0 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-45b

DATE COMPLETED: 2/14/95
LOCATION: See Figures 1 through 7

BORING NO. MB-37

ELEVATION: 2256 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730128
Easting - 774896

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2256 / 0							**SILTY SAND (SM)** - with gravel, light brown	slightly moist	loose
2251 / 5	1	97		34/12	▤		- trace organics		medum dense
2246 / 10				50/4	▤		**CLAYEY SAND (SC)** - with gravel, light brown		very dense
2241 / 15				94/9	▤				
2236 / 20				100/9	▤				
2231 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-46a

DATE COMPLETED: 2/14/95
LOCATION: See Figures 1 through 7

BORING NO. MB-37

ELEVATION: 2256 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730128
Easting - 774896

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2231 25				50/3	▤	▨	**CLAYEY SAND (SC)** - cont.	slightly moist	very dense
2226 30			G,A	50/2	▤	▨			

Bottom at 30.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-46b

DATE COMPLETED: 3/4/95
LOCATION: See Figures 1 through 7

BORING NO. MB-38

ELEVATION: 2264 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730643
Easting - 773490

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2264 / 0					░		**SILTY SAND (SM)** - light brown and yellow-brown	slightly mosit	dense
								moist	
2259 / 5	1	123		42/12	≡				
									very dense
2254 / 10				83/12	⧗				
2249 / 15	4	107	G,A	80/12	≡				
2244 / 20				50/2	≡				

Bottom at 20.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ≡ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-47

DATE COMPLETED: 2/14/9
LOCATION: See Figures 1 through 7

BORING NO. MB-39

ELEVATION: 2266 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 730816
Easting - 773018

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2266 / 0	10	94		7/12	▤		**CLAYEY, SILTY SAND (SC-SM)** - light brown	slightly moist	loose
							SILTY SAND (SM) - light brown and gray		medium dense
2261 / 5				24/12	▤				
							CLAYEY SAND (SC) - red-brown		
2256 / 10			G,A	25/12	▤		**SANDY CLAY (CL)** - red-brown		very stiff
							SILTY SAND (SM) - little clay, red-brown		medium dense
							- color change to gray below 14.0 feet		dense
2251 / 15				50/5	▤				very dense

Bottom at 16.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-48

DATE COMPLETED: 3/3/95

LOCATION: See Figures 1 through 7

BORING NO. MB-40

ELEVATION: 2274 ft.

** HAMMER WEIGHT: 140 lbs.

Northing - 731159
Easting - 772081

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2274 / 0	2				░		**SILTY SAND (SM)** - some gravel, yellow-brown	slightly moist moist	medium dense
							SANDY GRAVEL (GM) - light brown	slightly moist	dense
2269 / 5				46/12	▤				
							SILTY SAND (SM) - some gravel, light brown		very dense
2264 / 10	4			50/6	⧗				

Bottom at 10.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-49

LOCATION: See Figures 1 through 7

BORING NO. MB-41

ELEVATION: 2281 ft.
** HAMMER WEIGHT: 140 lbs.

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 731333 Easting - 771610 SOIL DESCRIPTION	MOISTURE	CONSIST.
2282 0					░		**SILTY SAND (SM)** - some gravel, light brown and yellow-brown	slightly noist to moist	dense
2277 5				87/11	▤			moist	very dense

Bottom at 6.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-50

DATE COMPLETED: 3/3/93
LOCATION: See Figures 1 through 7

BORING NO. MB-42

ELEVATION: 2286 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731505
Easting - 771141

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2286 0					▨		**SANDY GRAVEL (GM)** - with silt, some gravel and cobbles, yellow-brown	moist	very dense
2281 5				88/11	▤				

Bottom at 6.0 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-51

DATE COMPLETED: 2/16/95
LOCATION: See Figures 1 through 7

BORING NO. MB-43

ELEVATION: 2293 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731630
Easting - 770660

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2293 / 0							**SILTY SAND (SM)** - light brown and yellow-brown	moist	medium dense
	8				Bulk				
							SILTY CLAY (CL) - gray-brown		stiff
			R	36/12	Ca. S.S.				
2288 / 5	8	97	G,A						

Bottom at 5.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ◫ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-52

DATE COMPLETED: 2/15/95
LOCATION: See Figures 1 through 7

BORING NO. MB-44

ELEVATION: 2301 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731742
Easting - 770172

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2300 / 0						░	**SILTY SAND (SM)** - with gravel, red and yellow	sl.moist	loose
						░			medium dense
				21/12	▤	░			
	8	101				░	- color change to yellow/brown 2.0 to 4.0 feet	moist	
						░	- color change to light brown below 4.5 feet	dry	dense
2295 / 5				43/12	⧗	░			
2290 / 10				46/12	▤	░			
	1	135				░			

Bottom at 11.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-53

DATE COMPLETED: 2/13/95
LOCATION: See Figures 1 through 7

BORING NO. MB-45

ELEVATION: 2297 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731786
Easting - 769522

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2297 / 0						▥	**SILTY SAND (SM)** - with gravel, red-yellow	dry to sl.moist	loose
						▥			medium dense
						▥		moist	
				7/6 15/12	⧗	▥		slightly moist	
	11					▥			
2292 / 5				50/3	▤	▥			very dense
						▥	- color change to light brown below 7.0 feet		
2287 / 10	2			50/4	⧗	▥			
						▨	**CLAYEY SAND (SC)** - light brown		
2282 / 15	7	87	R G,A	26/6 97/7	▤	▨			

Bottom at 16.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-54

DATE COMPLETED: 2/15/95
LOCATION: See Figures 1 through 7

BORING NO. MB-46

ELEVATION: 2310 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731773
Easting - 769174

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2310 / 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	loose
									very dense
2305 / 5				62/12	▤				
	4								
2300 / 10				75/12	▤		**SILTY, CLAYEY SAND (SC-SM)** - with gravel, light brown		
	3								
2295 / 15				50/5	▤				

Bottom at 15.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▨ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-55

LOCATION: See Figures 1 through 7

BORING NO. MB-47

ELEVATION: 2325 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731644
Easting - 768180

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2325 / 0	7			18/12	⧗		**SILTY SAND (SM)** - with gravel, red-yellow	dry to slightly moist	loose med.dense dense
							CLAYEY SAND (SC) - light brown		
2320 / 5	5	86	G,A	21/12	▤		**SILTY SAND (SM)** - little gravel, light brown	slightly moist	
2315 / 10				67/12	⧗				very dense
2310 / 15				50/5	▤				

Bottom at 15.5 feet.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-56

DATE COMPLETED: 2/1/95
LOCATION: See Figures 1 through 7

BORING NO. MB-48

ELEVATION: 2331 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731573
Easting - 767689

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2331 / 0						▨	**SANDY CLAY (CL)** - with gravel, brown	slightly moist	stiff
						▨	- color change to light brown 2.0 to 8.0 feet		
						▨			very stiff
2326 / 5				34/12	▤	▨			hard
	3	103				▨			
						▨	- color change to white and light brown 8.0 to 15.0 feet		
2321 / 10				75/12	⊠	▨	- partially cemented		
	1					▨			
2316 / 15				50/4	▤	▨	- color change to light brown below 15.0 feet		
2311 / 20	3			50/2	▤	▨			

Bottom at 20.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⊠ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-57

DATE COMPLETED: 2/10/95
LOCATION: See Figures 1 through 7

BORING NO. MB-49

ELEVATION: 2340 ft.
** HAMMER WEIGHT: 140 lbs.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

Northing - 731037
Easting - 767269

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2340 / 0						▨	**SANDY CLAY (CL)** - with gravel, brown	dry to slightly moist	stiff
						▨	- color change to light brown below 2.5 feet		
						▨			very stiff
2335 / 5				26/12	▤	▨			
							CLAYEY GRAVEL (GC) - with sand, light brown		very dense
2330 / 10	2			50/4	▤				

Bottom at 10.5 feet.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ☐ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-58

DATE COMPLETED: 2/16/95
LOCATION: See Figures 1 through 7

BORING NO. MB-50

ELEVATION: 2337 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731536
Easting - 767293

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2337 / 0							**SILTY SAND (SM)** - with gravel, brown	slightly moist	dense
							- color change to light brown below 3.5 feet		
2332 / 5				31/6 54/12	▤				
2327 / 10	2	123	R G,A	15/6 35/12	▨				

Bottom at 11.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▨ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▧ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-59

LOCATION: See Figures 1 through 7

BORING NO. MB-51

ELEVATION: 2335 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 732036
Easting - 767257

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2335 / 0						▨	**CLAYEY SAND (SC)** - brown	slightly moist	medium dense
						▨	- color change to light brown below 2.0 feet		
2330 / 5				82/12	▤	▨			very dense
	1	106				▨			
2325 / 10	0			50/5	⧗	▨			

Bottom at 10.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-60

DATE COMPLETED: 2/17/93
LOCATION: See Figures 1 through 7

BORING NO. MB-52

ELEVATION: 2329 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731875
Easting - 767624

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2329 / 0						▨	**SANDY CLAY (CL)** - light brown - with gravel to 2.0 feet	slightly moist	stiff
2324 / 5	1		G,A, R	35/12	⧗		**POORLY GRADED SAND (SP-SM)** - with silt and gravel, light brown		dense

Bottom at 6.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE
A-61

DATE COMPLETED: 2/15/95
LOCATION: See Figures 1 through 7

BORING NO. MB-53

ELEVATION: 2326 ft.
** HAMMER WEIGHT: 140 lbs.

Northing - 731784
Easting - 768014

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2326 / 0				5/12			**WELL GRADED GRAVEL (GW-GM)** - with silt and sand, red-yellow	dry to slightly moist	loose
	6								
									medium dense
2321 / 5				28/12					
	1		G,A					dry	

Bottom at 6.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-62

ELEVATION: 2335 ft.

LOCATION: See Figures 1 through 7

BORING NO. MB-54

** HAMMER WEIGHT: 140 lbs.

Northing - 731225
Easting - 767622

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2335 / 0						▨	**CLAYEY SAND (SC)** - red-brown	slightly moist	medium dense
						▨	**SANDY CLAY (CL)** - light brown		stiff to very stiff
2330 / 5				48/12	▤	▨			hard

Bottom at 6.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-63

DATE COMPLETED: 2/15/95

LOCATION: See Figures 1 through 7

BORING NO. MB-55

ELEVATION: 2328 ft.

** HAMMER WEIGHT: 140 lbs.

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 731475 Easting - 768063 SOIL DESCRIPTION	MOISTURE	CONSIST.
2328 0						▒	**<u>SILTY SAND (SM)</u>** - with gravel, red-yellow	slightly moist	loose
						▒			medium dense
				32/12	▤	▒	- color change to yellow-brown 1.5 to 2.5 feet		
						▒	- color change to light brown below 2.5 feet		
2323 5	4			26/12	⧗	▒			
			R		⧗	▒			

Bottom at 6.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-64

DATE COMPLETED: 3/7/95 | ELEVATION: 2259 ft.

LOCATION: See Figures 1 through 7 | ** HAMMER WEIGHT: 140 lbs.

BORING NO. MB-56

Northing - 730291
Easting - 774430

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2259 / 0							**SILTY SAND (SM)** - with gravel, light brown	slightly moist	medium denswe
2254 / 5	1			28/12	⧗				dense
							- color change to yellow-brown 7.5 to 19.0 feet		very dense
2249 / 10				50/5	▤				
2244 / 15				50/5	⧗				
							- color change to light brown below 19.0 feet		
2239 / 20				50/2	▤				
2234 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND
TEST SUMMARY

PLATE
A-65a

LOCATION: See Figures 1 through 7

BORING NO. MB-56

** HAMMER WEIGHT: 140 lbs.

Northing - 730291
Easting - 774430

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2234 / 25				50/1			SILTY SAND (SM) - cont.	slightly moist	very dense
2229 / 30				50/2					

Bottom at 30.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV:

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

BY:

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-65b

DATE COMPLETED: 3/6/93

LOCATION: See Figures 1 through 7

BORING NO. MB-57

ELEVATION: 2262 ft.

** HAMMER WEIGHT: 140 lbs.

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730474 Easting - 773955 SOIL DESCRIPTION	MOISTURE	CONSIST.
2262 / 0							**SILTY SAND (SM)** - with gravel, light brown	slightly moist	medium dense
2257 / 5	2			38/12			**POORLY GRADED SAND (SP)** - with gravel, light brown		
									dense
2252 / 10				50/3					very dense
				95/9					
2247 / 15	0		G,A						
2242 / 20	1			50/5					
2237 / 25									

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ▒ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ▯ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

APPROV:

BY:

KLEINFELDER

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-66a

DATE COMPLETED: 3/6/95

BORING NO. MB-57

ELEVATION: 2262 ft.

LOCATION: See Figures 1 through 7

** HAMMER WEIGHT: 140 lbs.

elevation MSL DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	Northing - 730474 Easting - 773955 SOIL DESCRIPTION	MOISTURE	CONSIST.
2237 25			R	50/1	▤	░	**POORLY GRADED SAND (SP)** - cont. Bottom at 25.5 feet.	sl.moist	v.dense

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: █ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ☐ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

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SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE

A-66b

LOCATION: See Figures 1 through 7

BORING NO. DB- 2

** HAMMER WEIGHT: 140 lbs.

Northing - 729737
Easting - 774966

elevation MSL / DEPTH IN FEET	FIELD MOISTURE (%)	DRY DENSITY (pcf)	LAB TESTS*	BLOWS/ INCHES **	SAMPLER +	SYMBOL	SOIL DESCRIPTION	MOISTURE	CONSIST.
2263 / 0							**CLAYEY SAND (SC)** - with gravel, brown	slightly moist	medium dense
									dense
2258 / 5	4	104	S	50/5	▤				very dense
							- moderately cemented		medium dense
2253 / 10	7		G,A	18/12	⧗		**SILTY SAND (SM)** - brown		

Bottom at 11.5 feet.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* LAB TESTS: NR=No Recovery, C=Consolidation, A=Atterberg, Ch=Chemical test, S=Direct Shear, G=Grain-Size, E=Expansion, Sol=Solubility, Res=Resistivity, R=R-Value, Pp=Pocket Penetrometer

+SAMPLER TYPE: ■ Drive Sample 2.625" I.D. ▥ Nx core ░ Bulk ▤ Ca. S.S. Sample 1.925" I. D. ⧗ SPT Sample 1.375" I.D.

NOTES: Groundwater not encountered during drilling.

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SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

BORING LOG AND TEST SUMMARY

PLATE A-67

THE UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS				Group Symbols		TYPICAL NAMES
COARSE GRAINED SOIL More than 50% of the material is LARGER than the No. 200 Sieve.	**GRAVELS** More than 50% of coarse part is LARGER than the No. 4 Sieve.	**CLEAN GRAVELS** Less than 5% finer than No. 200 Sieve.		GW	⁘	Well graded gravels, gravel - sand mixtures, little or no fines, Cu>4 & 1<Cc>3
				GP	☰	Poorly graded gravels or gravel - sand mixtures, little or no fines Cu<4 or 1>Cc<3
		GRAVEL with fines More than 12% Finer than No. 200 Sieve.	PI <4	GM	▦	Silty gravels, gravel - sand - silt mixtures
			PI >7	GC	▨	Clayey gravels, gravel - sand - clay mixtures
	SANDS More than 50 % of coarse part is SMALLER than the No. 4 Sieve.	**CLEAN SANDS** Less than 5% Finer than No. 200 Sieve.		SW	⁘	Well graded sands, gravelly sands, little or no fines. Cu>6& 1<Cc>3
				SP	⁘	Poorly graded sands or gravelly sands, little or no fines. Cu<6 or 1>Cc<3
		SAND with fines More than 12% Finer than No. 200 Sieve.	PI <5	SM	▥	Silty sands, sand - silt mixtures
			PI >7	SC	▨	Clayey sands, sand - clay mixtures
FINE GRAINED SOIL More than 50 % of the material is SMALLER than the No. 200 Sieve	**SILTS & CLAYS** Liquid Limit LESS than 50		PI - Below A - Line	ML	▥	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with low plasticity
			PI - Above A - Line	CL	▨	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
				OL	▥	Organic silts and organic clays of low plasticity
	SILTS & CLAYS Liquid Limit GREATER than 50		PI - Below A - line	MH	▥	Inorganic silts, Micaceous or diatomaceous fine sands or silty soils, elastic silts
			PI - Above A - Line	CH	▨	Inorganic clays of high plasticity, fat clays
				OH	▨	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS				Pt		Peat and other highly organic soils

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

CLAY	SILT	SAND			GRAVEL		COBBLES	BOULDERS
		Fine	Medium	Coarse	Fine	Coarse		

0.002 mm #200 #40 #10 #4 3/4" 3" 12"

U. S. Standard Sieve Size

Descriptive Terms Used With Soils

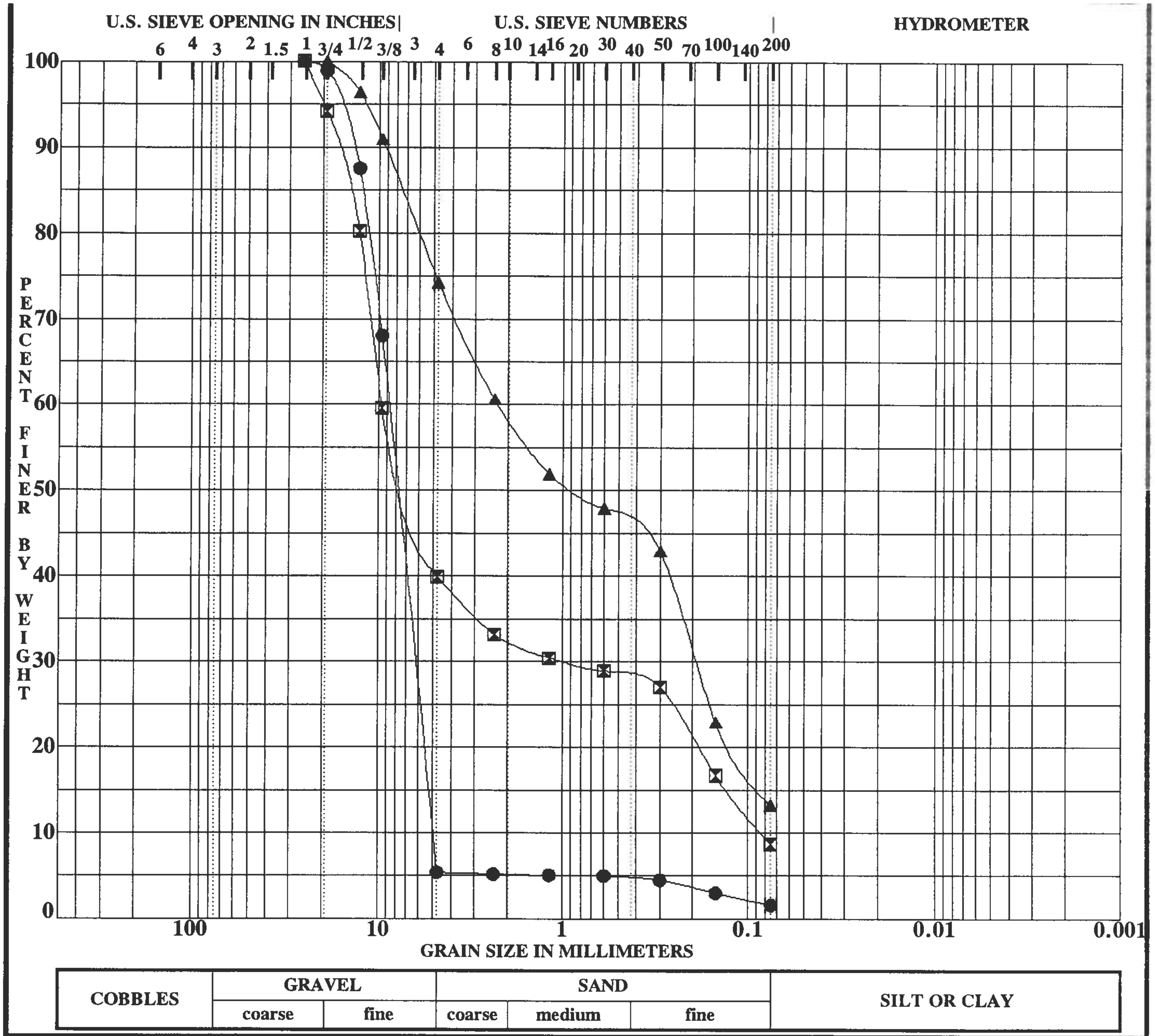
CONSISTANCY			Moisture Content	
	SILTS & CLAYS	SANDS & GRAVELS		
Strongest ↑	Very Stiff	Very Dense	Wettest ↑	Wet
	Stiff	Dense		Very Moist
	Medium Stiff	Medium Dense		Moist
Weakest ↓	Soft	Loose		Slightly Moist
			Driest ↓	Dry

	CALICHE	Cemented Sand & Gravel	
Strongest ↑	Very Hard	Very Hard	Difficult to scratch or break
	Hard	Hard	Scratches leave only dust, Requires many hammer blows to break
	Moderately Hard	Moderately Hard	Readily cut by knife,crumbles with several hammer blows
Weakest ↓	Partially cemented	Partially cemented	Gouges easily with knife, crumbles readily with few hammer blows

KEY TO SOIL SYMBOLS AND TERMS

PROJECT : Southern Segment, Las Vegas Beltway, Section 6 PLATE NO.: A-68

PROJECT NO.: 31-215904



	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	DA- 1	40.0	POORLY GRADED GRAVEL (GP)	NP	NP	NP	0.89	1.7
☒	DA- 2	15.0	WELL GRADED GRAVEL with SILT and SAND (GW-GM)	NP	NP	NP	1.21	114.2
▲	DA- 3	30.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	DA- 1	40.0	25.40	8.72	6.245	4.9990	94.6	3.8	1.6	
☒	DA- 2	15.0	25.40	9.58	0.985	0.0839	60.1	31.2	8.7	
▲	DA- 3	30.0	19.10	2.25	0.192		25.8	61.0	13.2	

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SOILS AND MATERIALS TESTING

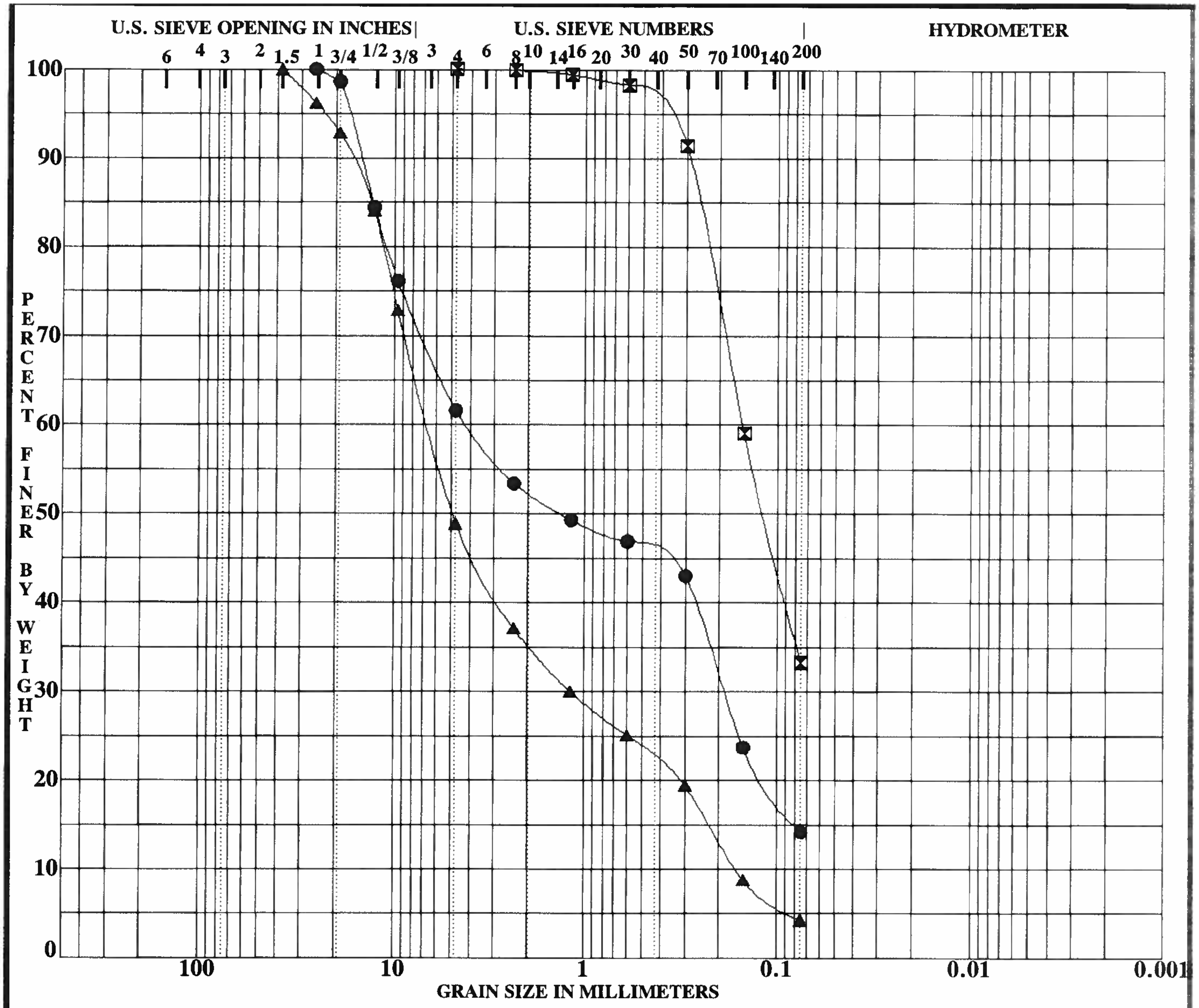
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	DA- 3	40.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		
☒	DB- 2	10.0	SILTY SAND (SM)	NP	NP	NP		
▲	DB- 4	1.0	WELL GRADED GRAVEL with SAND (GW)	NP	NP	NP	1.31	40.5

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	DA- 3	40.0	25.40	4.14	0.188		38.4	47.4	14.2	
☒	DB- 2	10.0	4.75	0.15			0.0	66.7	33.3	
▲	DB- 4	1.0	38.10	6.56	1.180	0.1622	51.1	44.6	4.3	

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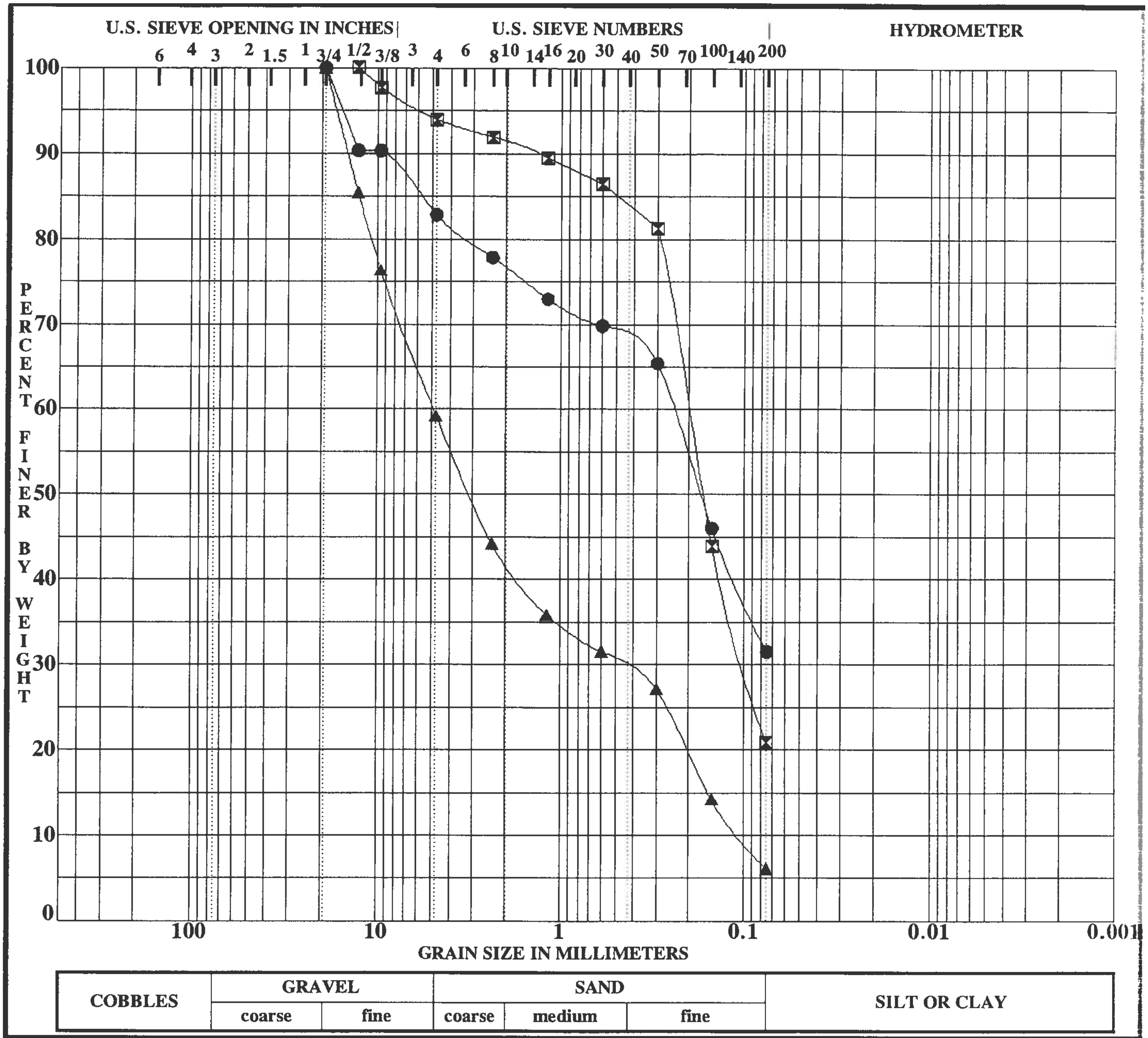
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-2



	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	DB- 4	15.0	CLAYEY SAND with GRAVEL (SC)	41	25	16		
☒	DB- 5	5.0	SILTY SAND (SM)	NP	NP	NP		
▲	DB- 5	15.0	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	NP	NP	NP	0.44	46.9

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	DB- 4	15.0	19.10	0.25			17.2	51.3	31.5	
☒	DB- 5	5.0	12.70	0.20	0.099		6.1	73.1	20.8	
▲	DB- 5	15.0	19.10	4.91	0.474	0.1047	40.8	53.1	6.1	

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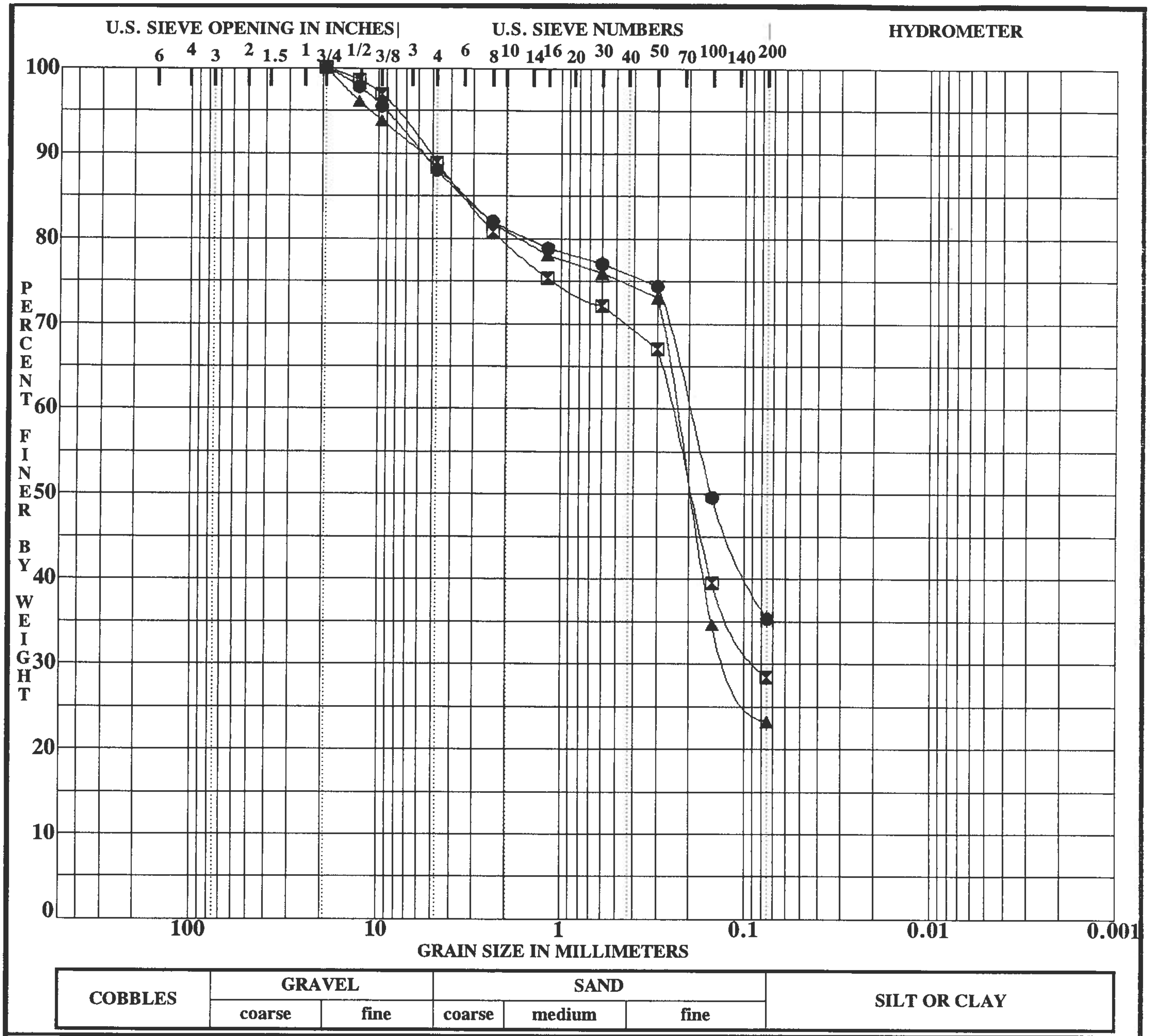
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-3



	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	DB- 6	5.0	SILTY, CLAYEY SAND (SC-SM)	22	15	7		
☒	DB- 7	10.0	CLAYEY SAND (SC)	28	17	11		
▲	DB- 8	5.0	CLAYEY SAND (SC)	25	16	9		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	DB- 6	5.0	19.10	0.20			12.0	52.7	35.3	
☒	DB- 7	10.0	19.10	0.25	0.083		11.1	60.5	28.4	
▲	DB- 8	5.0	19.10	0.24	0.113		11.7	65.1	23.2	

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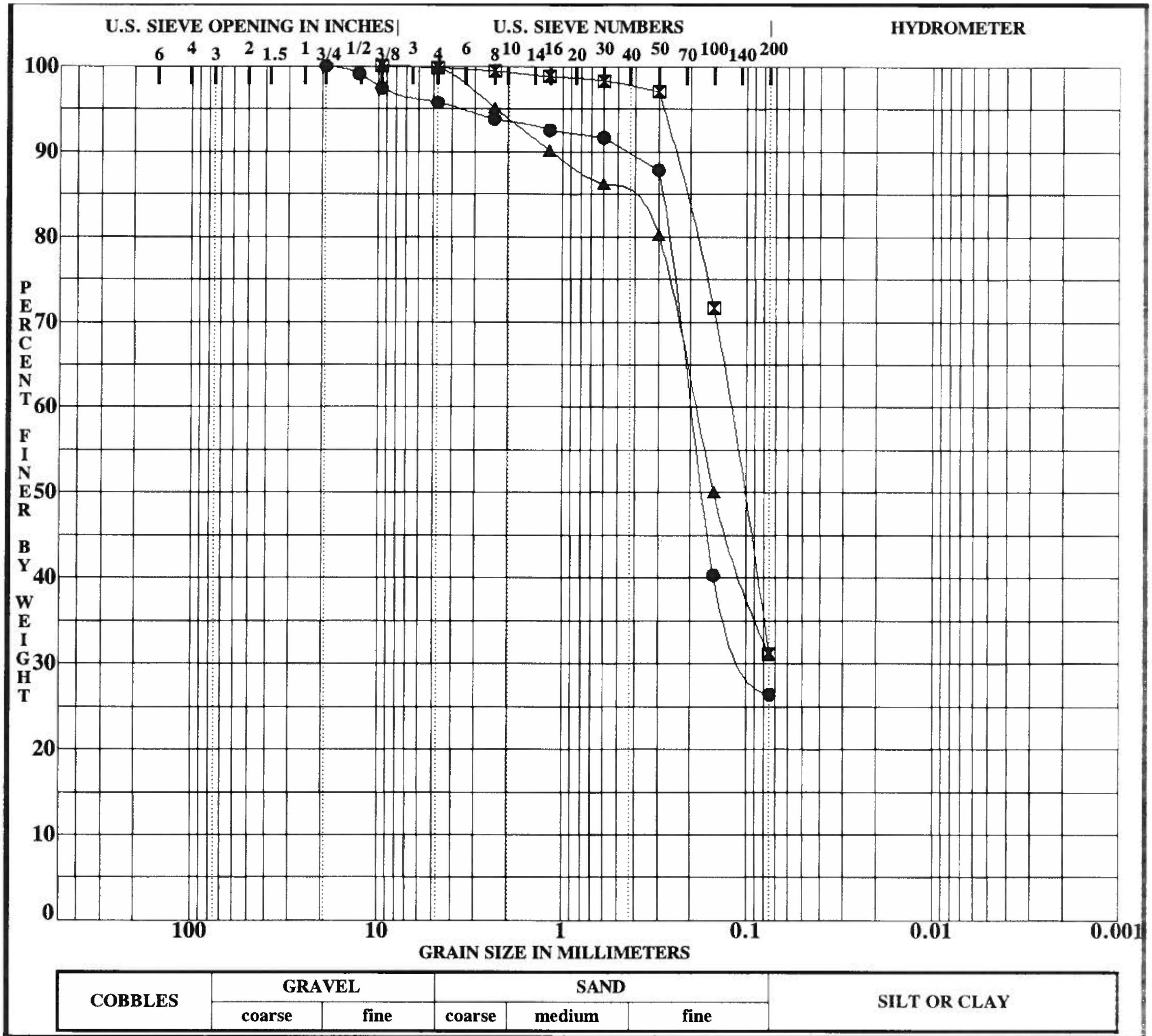
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-4



	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	DB- 9	5.0	SILTY SAND (SM)	NP	NP	NP		
☒	MB- 1	6.0	SILTY SAND (SM)	NP	NP	NP		
▲	MB- 2	4.0	SILTY SAND (SM)	NP	NP	NP		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	DB- 9	5.0	19.10	0.20	0.090		4.3	69.3	26.4	
☒	MB- 1	6.0	9.53	0.12			0.2	68.7	31.1	
▲	MB- 2	4.0	9.53	0.19			0.1	68.9	31.0	

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SOILS AND MATERIALS TESTING

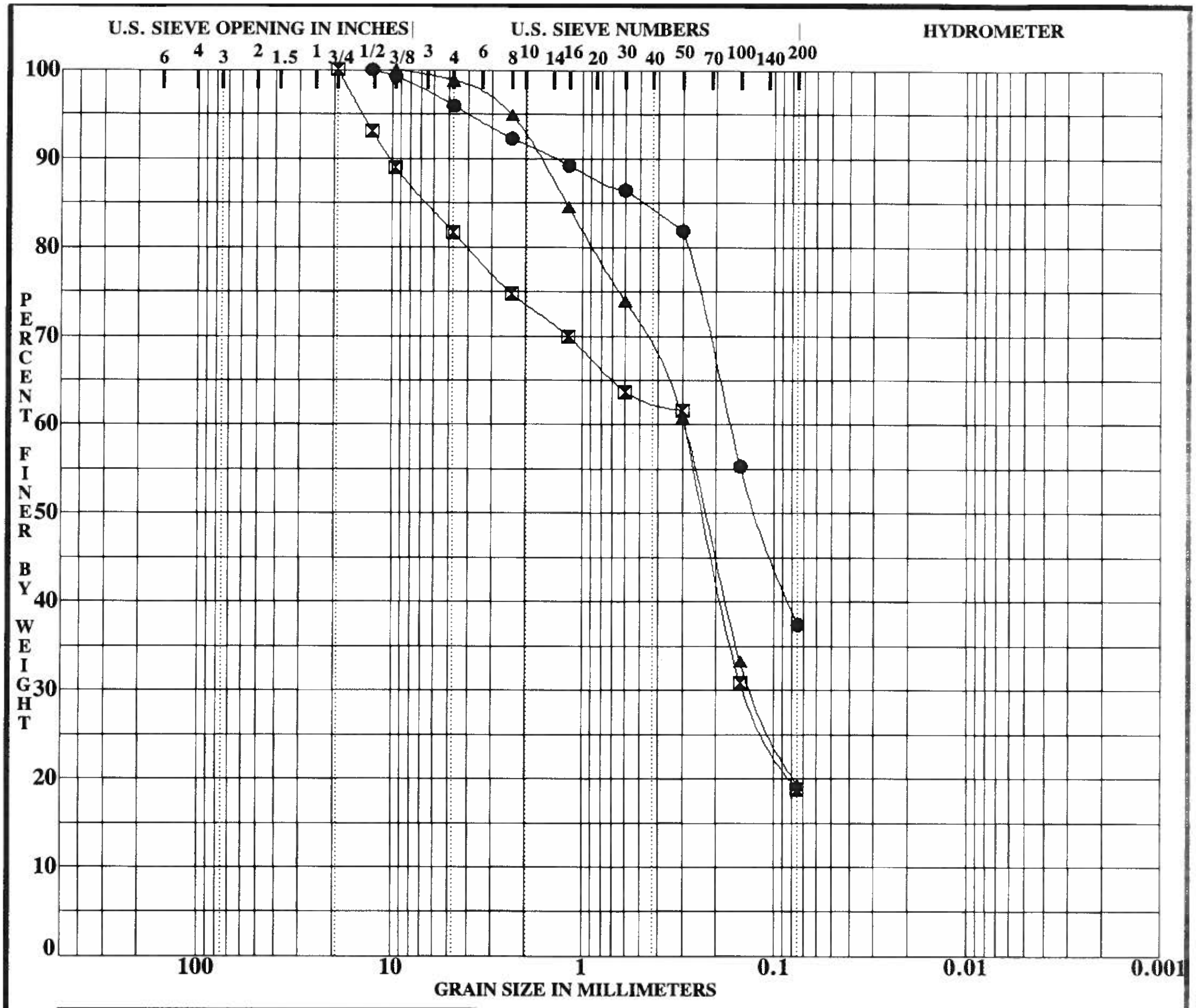
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB- 3	3.0	SILTY SAND (SM)	NP	NP	NP		
☒	MB- 4	3.0	SILTY SAND with GRAVEL (SM)	20	18	2		
▲	MB- 5	3.0	SILTY SAND (SM)	NP	NP	NP		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB- 3	3.0	12.70	0.17			4.1	58.5	37.4	
☒	MB- 4	3.0	19.10	0.29	0.143		18.4	62.8	18.8	
▲	MB- 5	3.0	9.53	0.29	0.127		1.2	79.5	19.3	

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SOILS AND MATERIALS TESTING

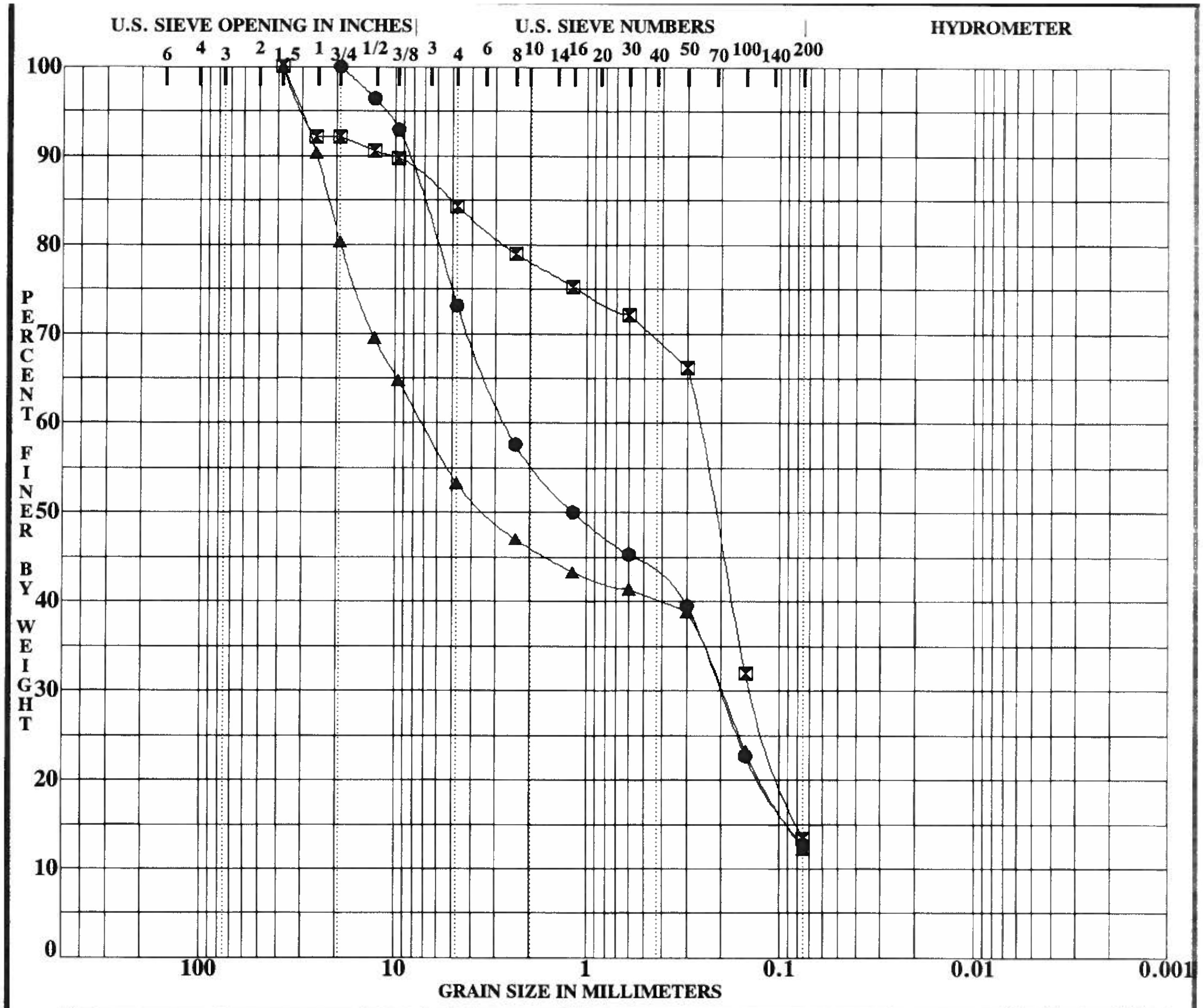
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-6



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB- 7	10.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		
☒	MB-12	16.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		
▲	MB-15	25.0	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)	19	17	2	0.08	102.2

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB- 7	10.0	19.10	2.63	0.203		26.9	60.4	12.7	
☒	MB-12	16.0	38.10	0.26	0.140		15.7	70.9	13.4	
▲	MB-15	25.0	38.10	7.15	0.202		46.7	41.1	12.2	

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SOILS AND MATERIALS TESTING

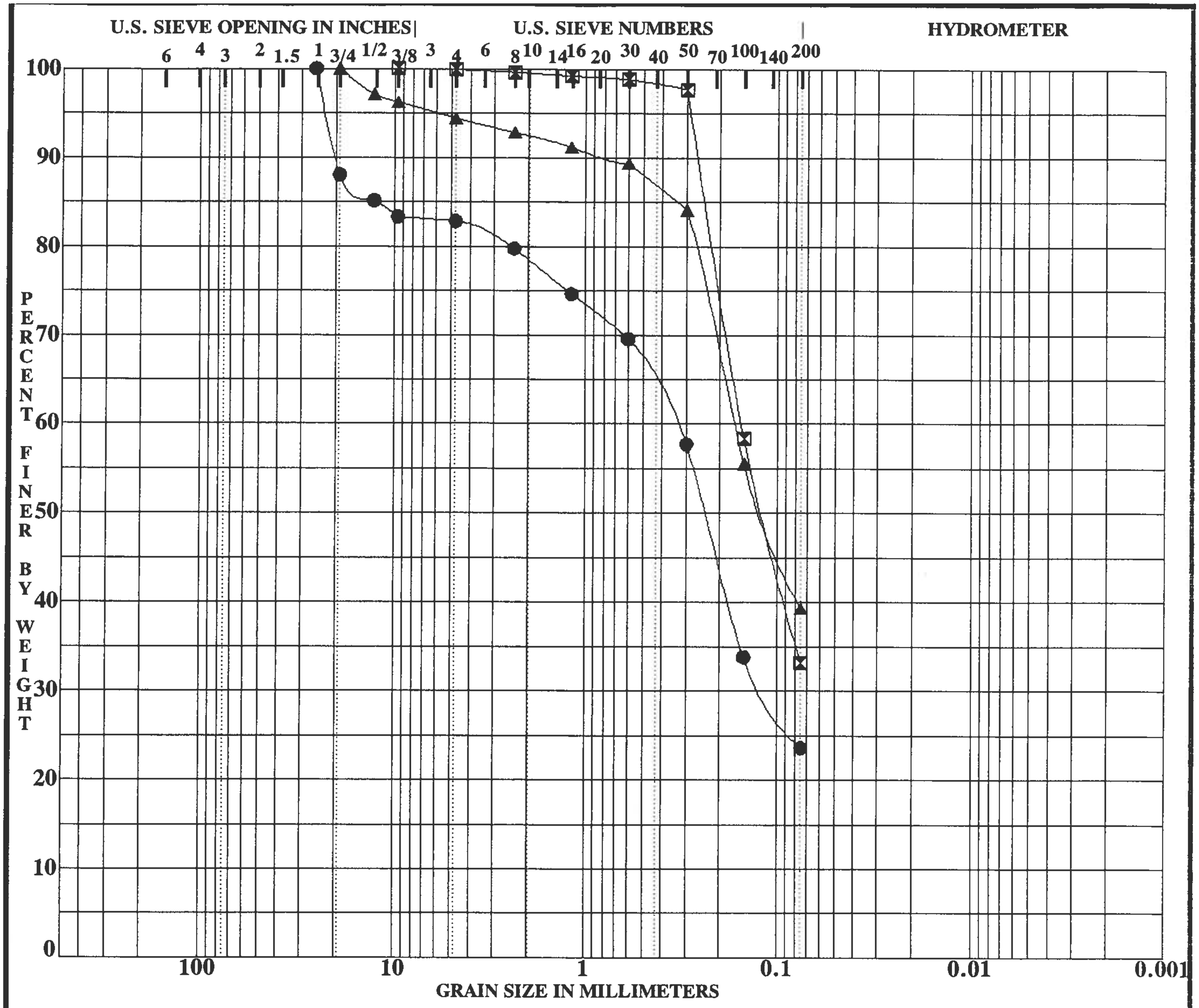
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-7



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-17	10.5	CLAYEY SAND with GRAVEL (SC)	27	17	10		
☒	MB-18	6.0	SILTY SAND (SM)	NP	NP	NP		
▲	MB-20	15.0	CLAYEY SAND (SC)	23	13	10		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-17	10.5	25.40	0.34	0.116		17.2	59.2	23.6	
☒	MB-18	6.0	9.53	0.15			0.1	66.8	33.1	
▲	MB-20	15.0	19.10	0.17			5.6	55.1	39.3	

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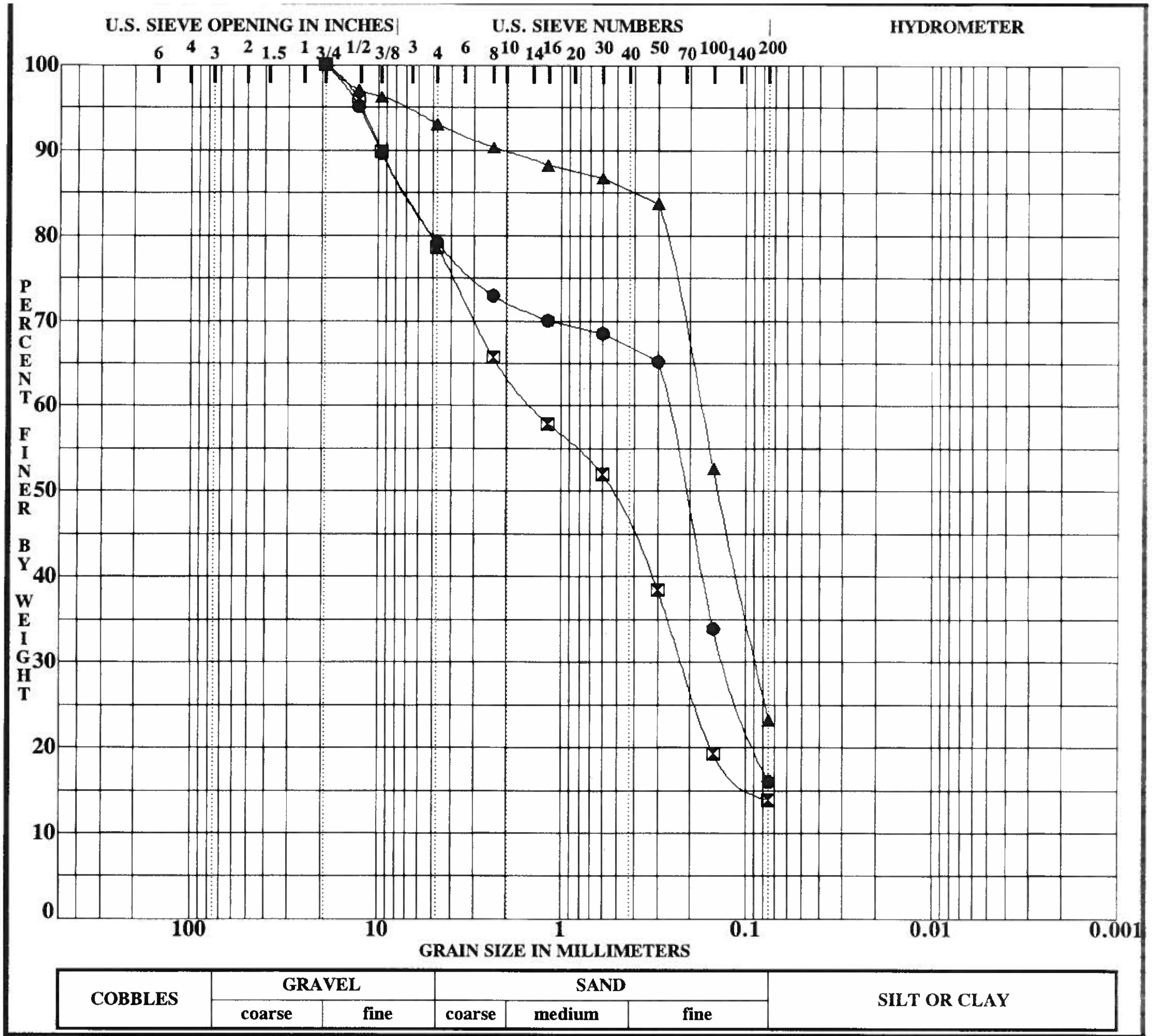
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-8



	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-24	16.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		
☒	MB-26	15.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		
▲	MB-27	10.0	SILTY SAND (SM)	NP	NP	NP		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-24	16.0	19.10	0.27	0.129		20.9	63.1	16.0	
☒	MB-26	15.0	19.10	1.42	0.221		21.4	64.7	13.9	
▲	MB-27	10.0	19.10	0.18	0.088		7.0	69.8	23.2	

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SOILS AND MATERIALS TESTING

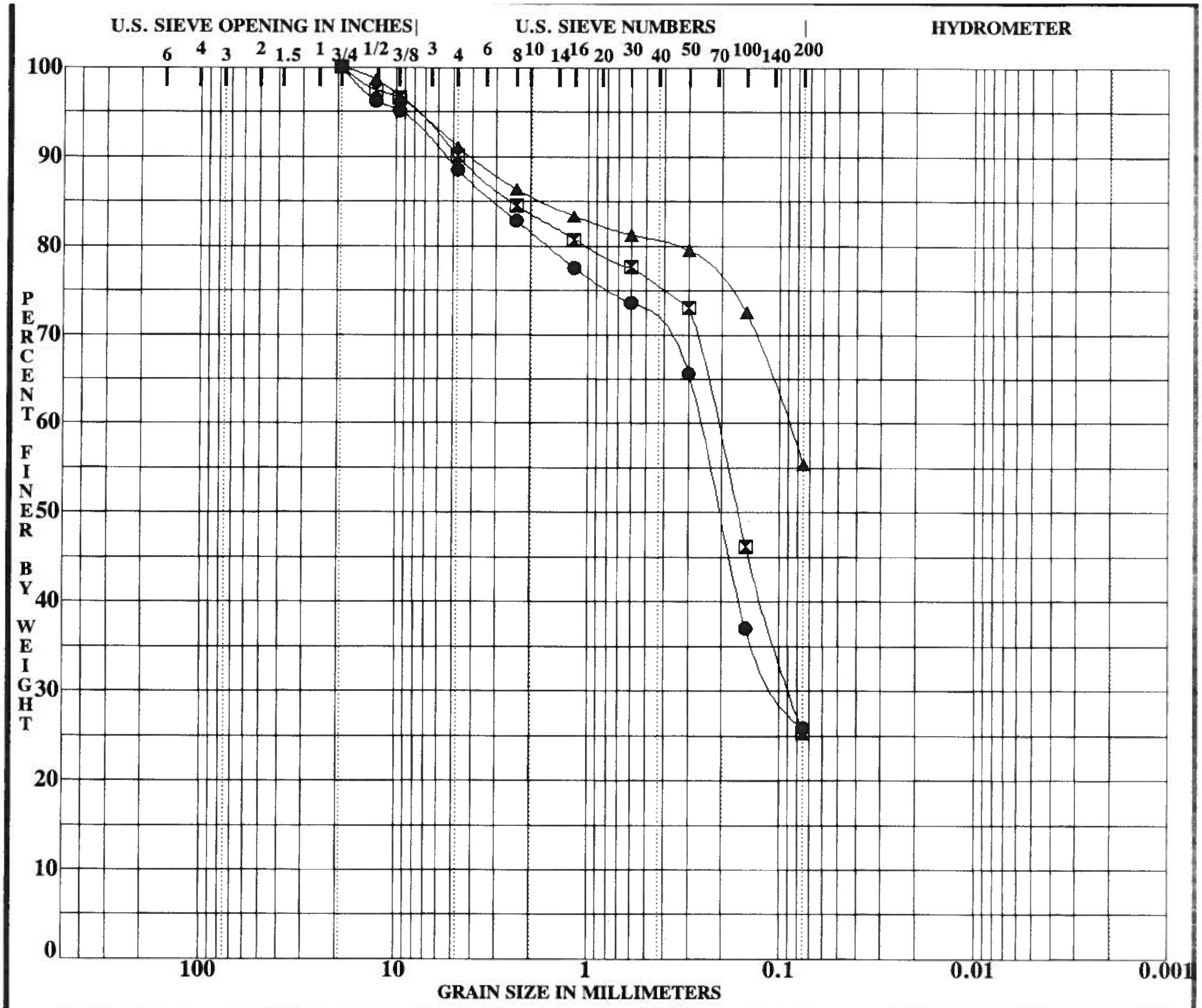
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-9



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-28	3.0	SILTY SAND (SM)	NP	NP	NP		
☒	MB-29	25.0	CLAYEY SAND (SC)	20	13	7		
▲	MB-34	6.0	SANDY LEAN CLAY (CL)	24	16	8		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-28	3.0	19.10	0.26	0.097		11.5	62.7	25.8	
☒	MB-29	25.0	19.10	0.21	0.088		10.0	64.7	25.3	
▲	MB-34	6.0	19.10	0.09			9.0	35.7	55.3	

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SOILS AND MATERIALS TESTING

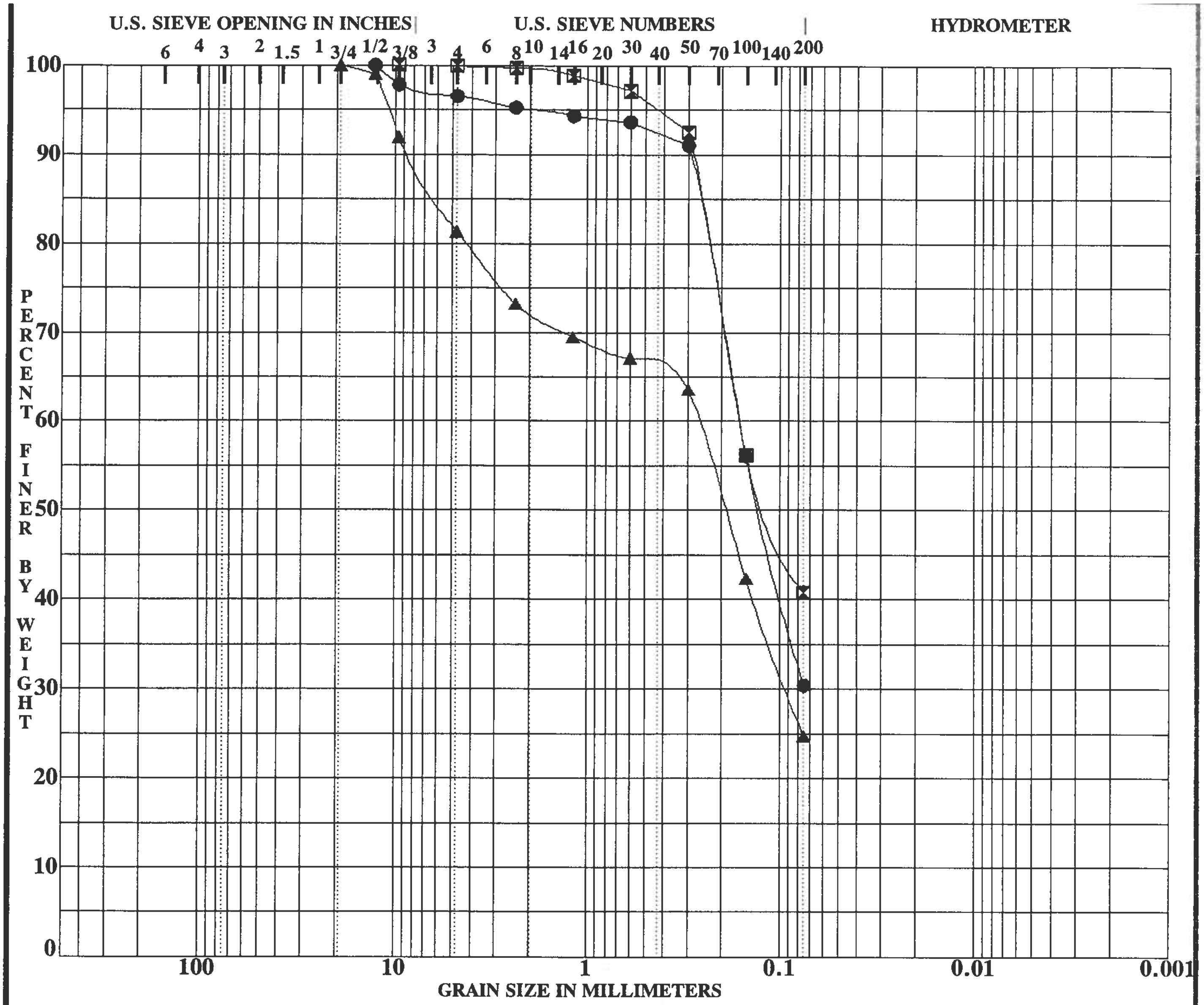
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-35	25.5	CLAYEY SAND (SC)	27	17	10		
☒	MB-37	30.0	CLAYEY SAND (SC)	36	22	14		
▲	MB-38	16.0	SILTY SAND with GRAVEL (SM)	NP	NP	NP		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-35	25.5	12.70	0.16			3.5	66.1	30.4	
☒	MB-37	30.0	9.53	0.16			0.1	59.1	40.8	
▲	MB-38	16.0	19.10	0.27	0.092		18.7	56.6	24.7	

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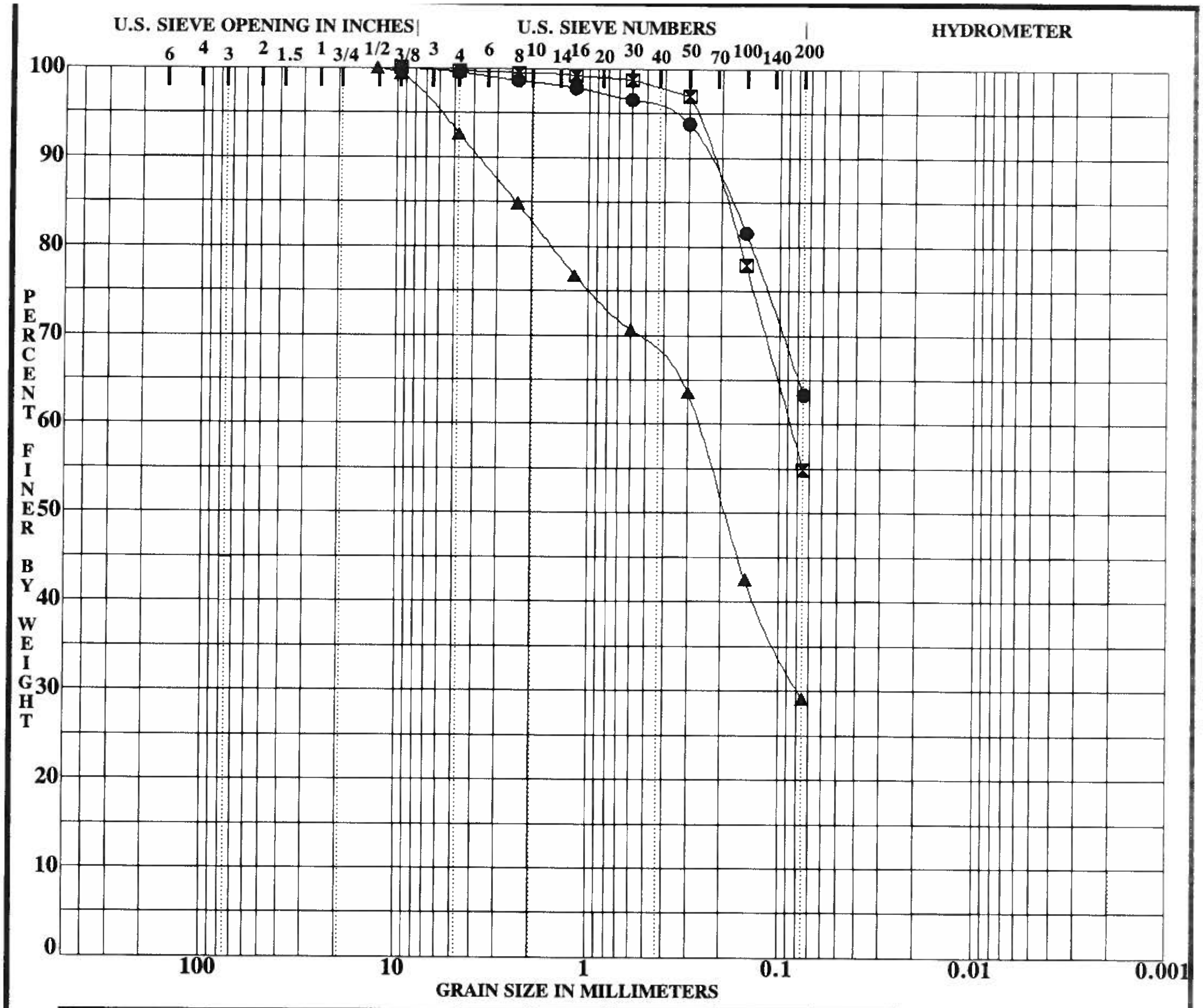
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas
Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-11



<table>
<tr><td rowspan="2">COBBLES</td><td colspan="2">GRAVEL</td><td colspan="3">SAND</td><td rowspan="2">SILT OR CLAY</td></tr>
<tr><td>coarse</td><td>fine</td><td>coarse</td><td>medium</td><td>fine</td></tr>
</table>

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-39	11.0	SANDY LEAN CLAY (CL)	34	14	20		
☒	MB-43	5.0	SANDY LEAN CLAY (CL)	21	12	9		
▲	MB-45	16.0	CLAYEY SAND (SC)	36	22	14		

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-39	11.0	9.53				0.5	36.2	63.3	
☒	MB-43	5.0	9.53	0.09			0.3	44.8	54.9	
▲	MB-45	16.0	12.70	0.27	0.079		7.4	63.5	29.1	

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

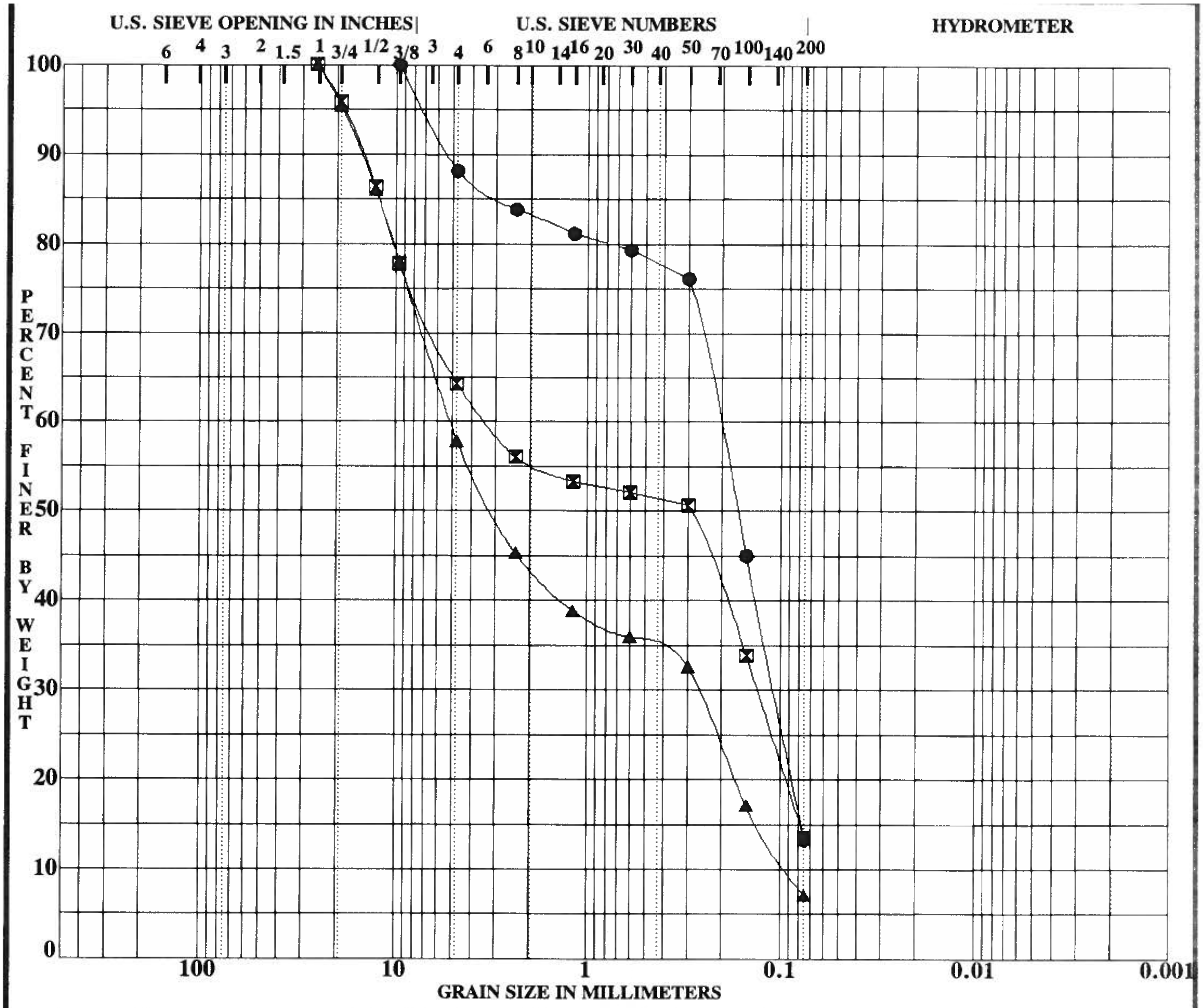
PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

GRAIN SIZE ANALYSES

PLATE

B-12



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-47	6.0	SILTY SAND (SM)	NP	NP	NP		
☒	MB-50	10.5	SILTY SAND with GRAVEL (SM)	NP	NP	NP		
▲	MB-52	5.0	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	NP	NP	NP	0.15	55.9

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-47	6.0	9.53	0.21	0.108		11.9	74.8	13.3	
☒	MB-50	10.5	25.40	3.31	0.131		35.7	50.8	13.5	
▲	MB-52	5.0	25.40	5.12	0.267	0.0917	42.2	50.7	7.1	

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SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

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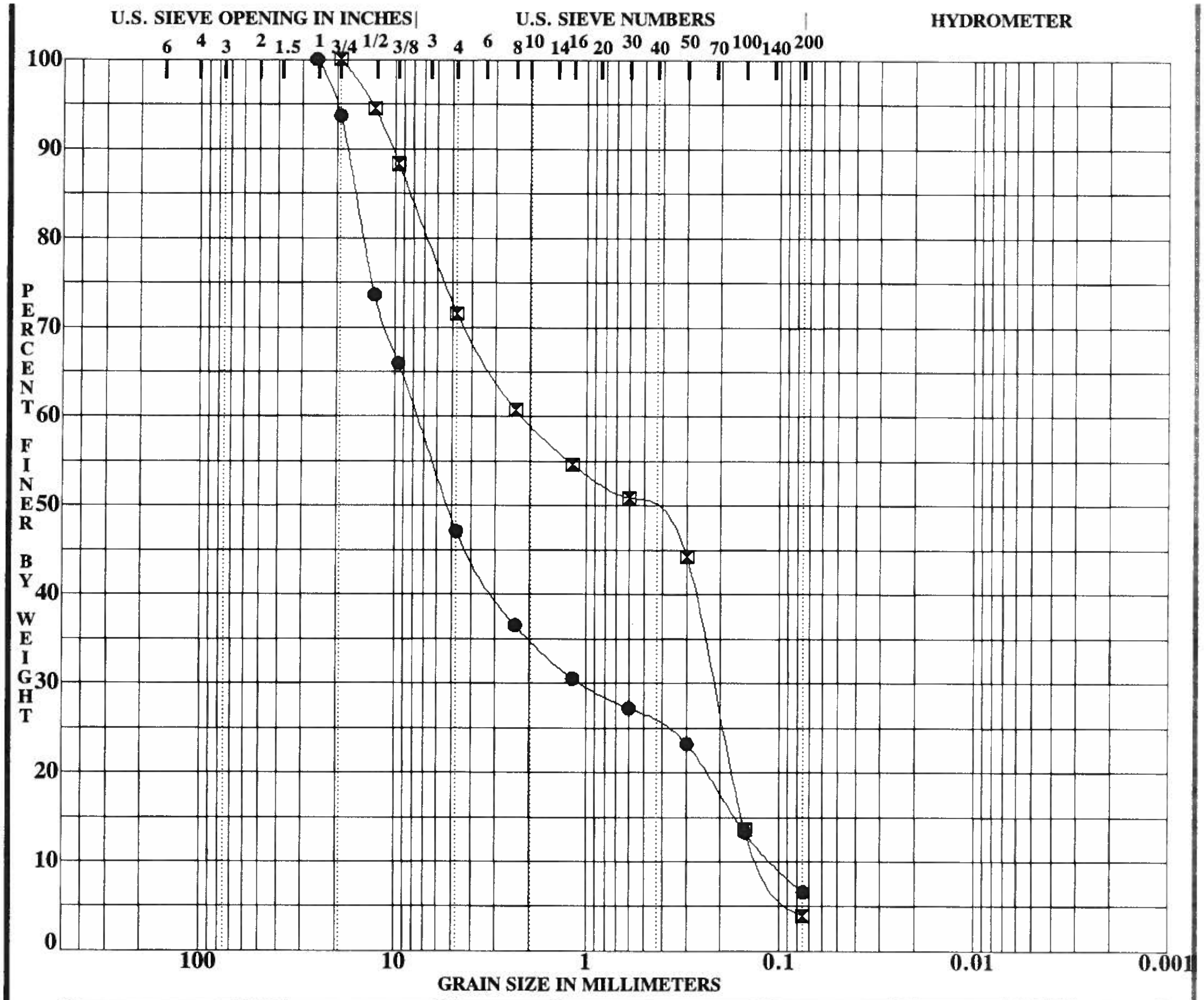
GRAIN SIZE ANALYSES

PLATE

B-13



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	MB-53	6.0	WELL GRADED GRAVEL with SILT and SAND (GW-GM)	NP	NP	NP	1.39	71.8
☒	MB-57	15.0	POORLY GRADED SAND with GRAVEL (SP)	NP	NP	NP	0.19	18.8

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	MB-53	6.0	25.40	7.66	1.065	0.1066	52.9	40.5	6.6	
☒	MB-57	15.0	19.10	2.18	0.218	0.1157	28.5	67.5	4.0	

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SOILS AND MATERIALS TESTING

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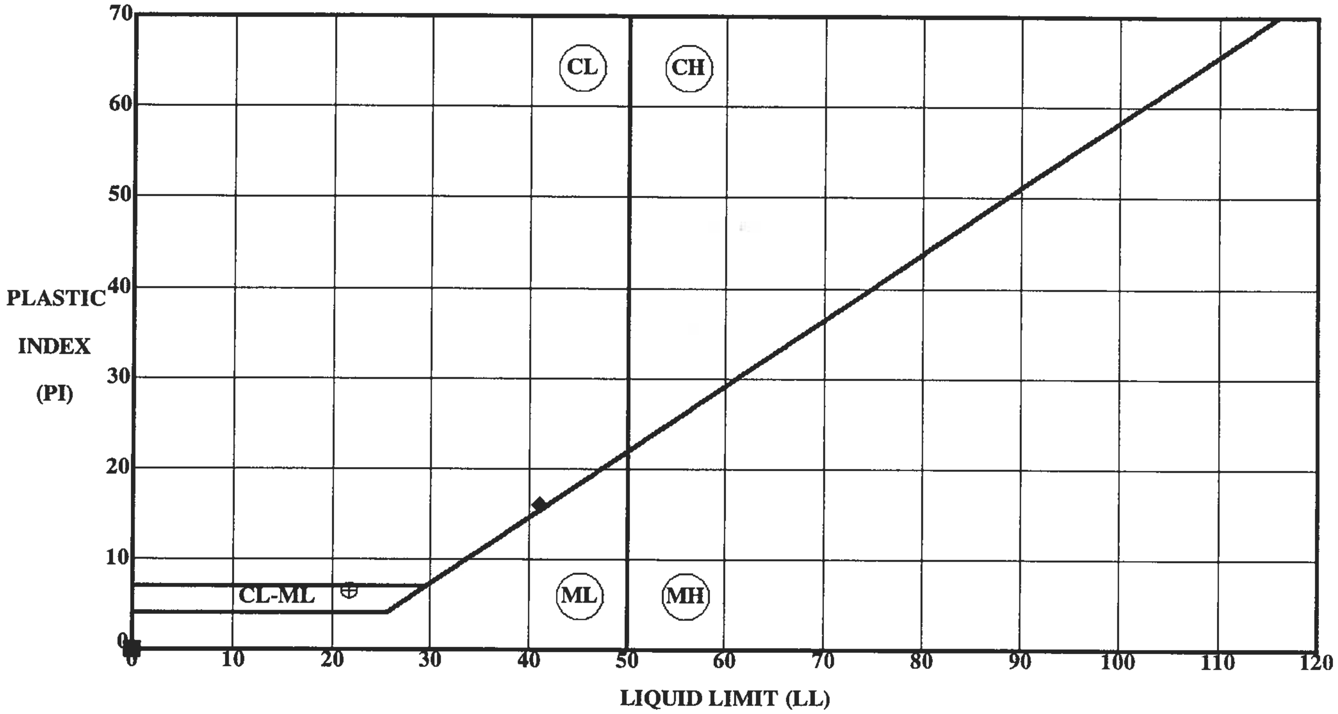
GRAIN SIZE ANALYSES

PLATE

B-14



	Exploration No.	Depth, ft.	LL	PL	PI	Fines	Classification
●	DA- 1	40.0	NP	NP	NP	1.6	POORLY GRADED GRAVEL (GP)
⊠	DA- 2	15.0	NP	NP	NP	8.7	WELL GRADED GRAVEL with SILT and SAND (GW-GM)
▲	DA- 3	30.0	NP	NP	NP	13.2	SILTY SAND with GRAVEL (SM)
★	DA- 3	40.0	NP	NP	NP	14.2	SILTY SAND with GRAVEL (SM)
✖	DB- 2	10.0	NP	NP	NP	33.3	SILTY SAND (SM)
✿	DB- 4	1.0	NP	NP	NP	4.3	WELL GRADED GRAVEL with SAND (GW)
◆	DB- 4	15.0	41	25	16	31.5	CLAYEY SAND with GRAVEL (SC)
■	DB- 5	5.0	NP	NP	NP	20.8	SILTY SAND (SM)
⊗	DB- 5	15.0	NP	NP	NP	6.1	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)
⊕	DB- 6	5.0	22	15	7	35.3	SILTY, CLAYEY SAND (SC-SM)

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PROJECT NO. 31-215904

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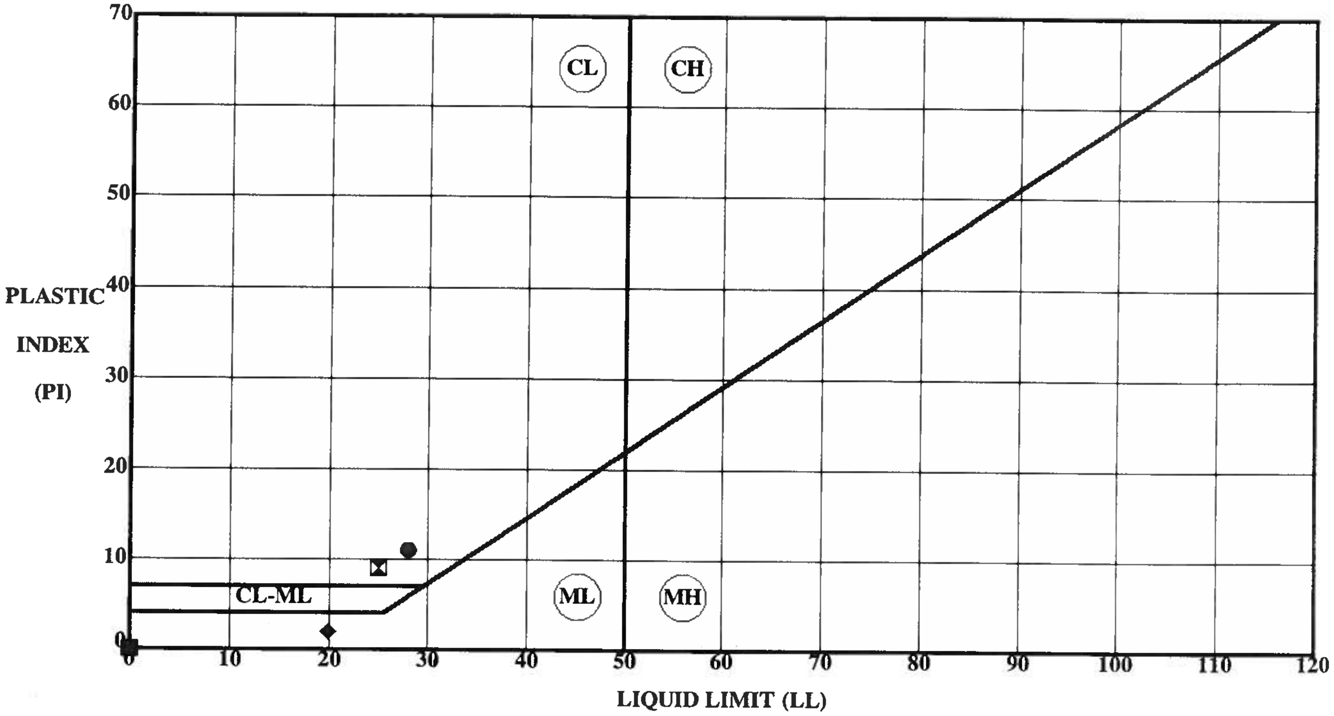
ATTERBERG LIMITS
TEST RESULTS

PLATE
B-15



	Exploration No.	Depth, ft.	LL	PL	PI	Fines	Classification
●	DB- 7	10.0	28	17	11	28.4	CLAYEY SAND (SC)
☒	DB- 8	5.0	25	16	9	23.2	CLAYEY SAND (SC)
▲	DB- 9	5.0	NP	NP	NP	26.4	SILTY SAND (SM)
★	MB- 1	6.0	NP	NP	NP	31.1	SILTY SAND (SM)
✖	MB- 2	4.0	NP	NP	NP	31.0	SILTY SAND (SM)
✿	MB- 3	3.0	NP	NP	NP	37.4	SILTY SAND (SM)
◆	MB- 4	3.0	20	18	2	18.8	SILTY SAND with GRAVEL (SM)
■	MB- 5	3.0	NP	NP	NP	19.3	SILTY SAND (SM)
⊗	MB- 7	10.0	NP	NP	NP	12.7	SILTY SAND with GRAVEL (SM)
⊕	MB-12	16.0	NP	NP	NP	13.4	SILTY SAND with GRAVEL (SM)

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SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

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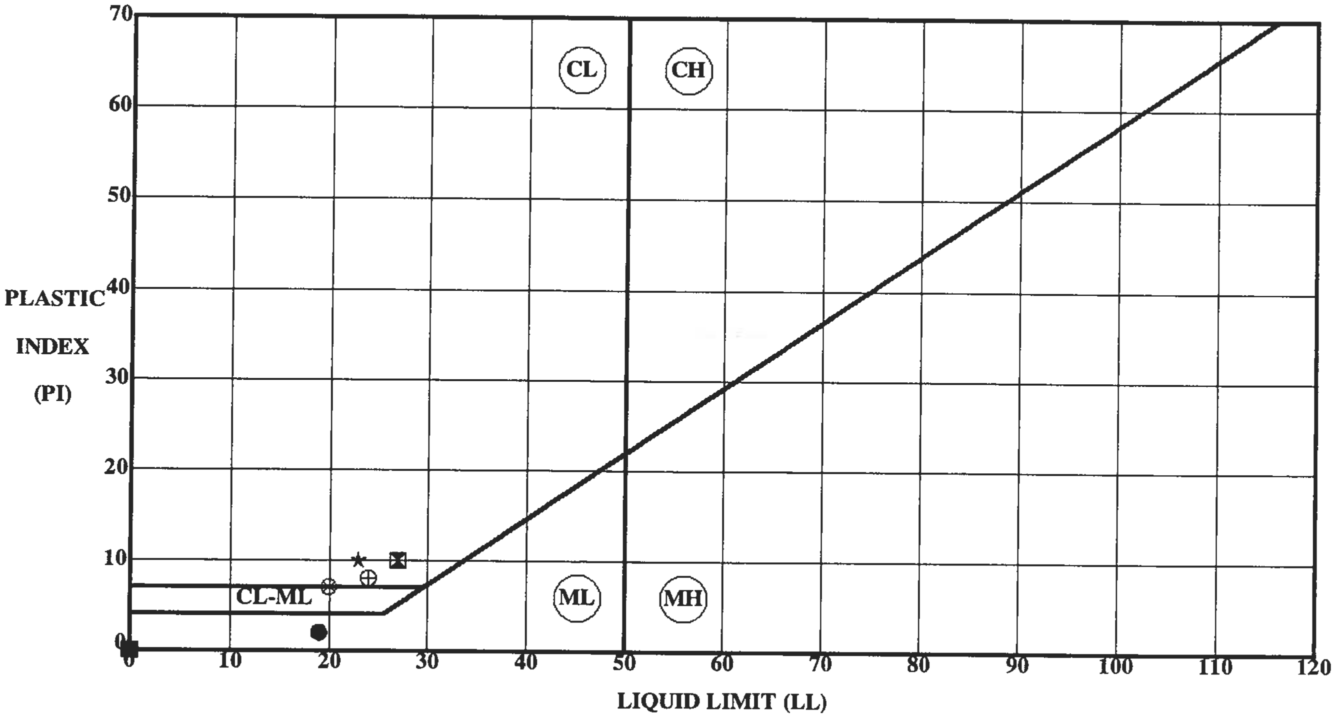
ATTERBERG LIMITS
TEST RESULTS

PLATE

B-16



	Exploration No.	Depth, ft.	LL	PL	PI	Fines	Classification
●	MB-15	25.0	19	17	2	12.2	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
⊠	MB-17	10.5	27	17	10	23.6	CLAYEY SAND with GRAVEL (SC)
▲	MB-18	6.0	NP	NP	NP	33.1	SILTY SAND (SM)
★	MB-20	15.0	23	13	10	39.3	CLAYEY SAND (SC)
✖	MB-24	16.0	NP	NP	NP	16.0	SILTY SAND with GRAVEL (SM)
✿	MB-26	15.0	NP	NP	NP	13.9	SILTY SAND with GRAVEL (SM)
◆	MB-27	10.0	NP	NP	NP	23.2	SILTY SAND (SM)
■	MB-28	3.0	NP	NP	NP	25.8	SILTY SAND (SM)
⊗	MB-29	25.0	20	13	7	25.3	CLAYEY SAND (SC)
⊕	MB-34	6.0	24	16	8	55.3	SANDY LEAN CLAY (CL)

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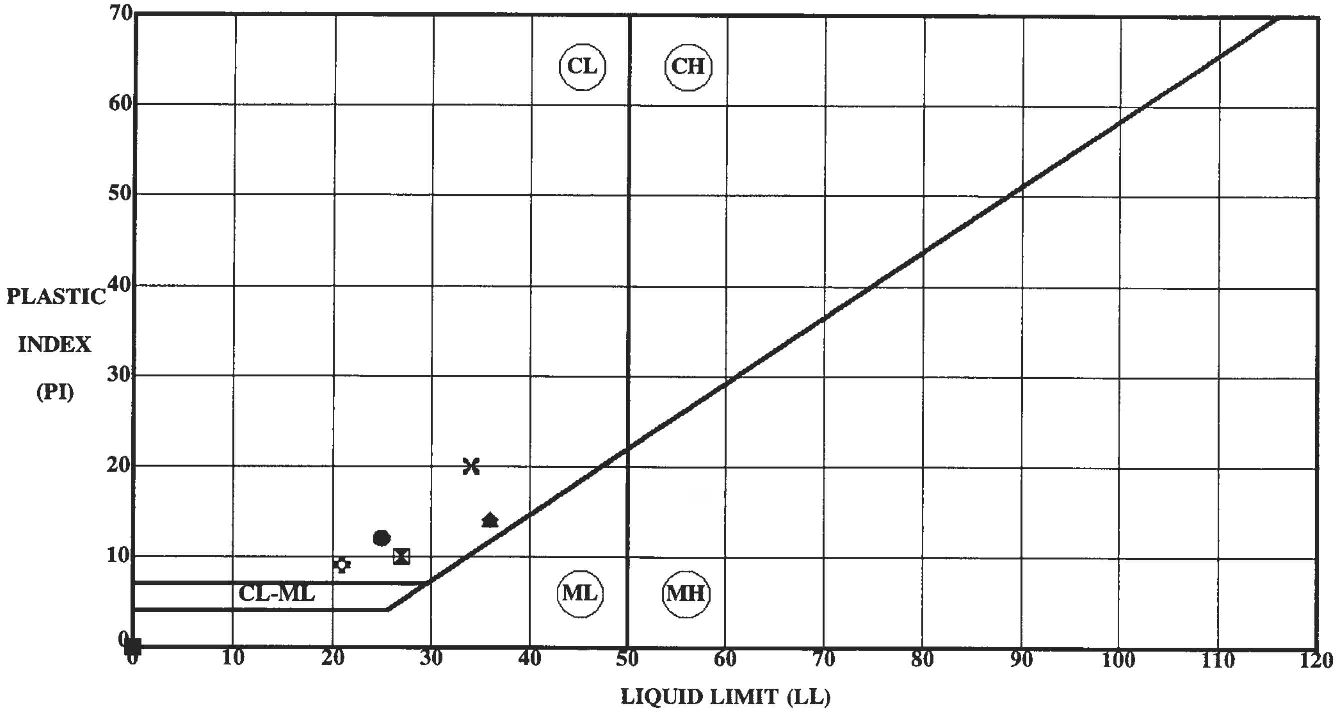
ATTERBERG LIMITS
TEST RESULTS

PLATE

B-17



	Exploration No.	Depth, ft.	LL	PL	PI	Fines	Classification
●	MB-35	6.0	25	13	12		()
⊠	MB-35	25.5	27	17	10	30.4	CLAYEY SAND (SC)
▲	MB-37	30.0	36	22	14	40.8	CLAYEY SAND (SC)
★	MB-38	16.0	NP	NP	NP	24.7	SILTY SAND with GRAVEL (SM)
✕	MB-39	11.0	34	14	20	63.3	SANDY LEAN CLAY (CL)
✿	MB-43	5.0	21	12	9	54.9	SANDY LEAN CLAY (CL)
◆	MB-45	16.0	36	22	14	29.1	CLAYEY SAND (SC)
■	MB-47	6.0	NP	NP	NP	13.3	SILTY SAND (SM)
⊗	MB-50	10.5	NP	NP	NP	13.5	SILTY SAND with GRAVEL (SM)
⊕	MB-52	5.0	NP	NP	NP	7.1	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)

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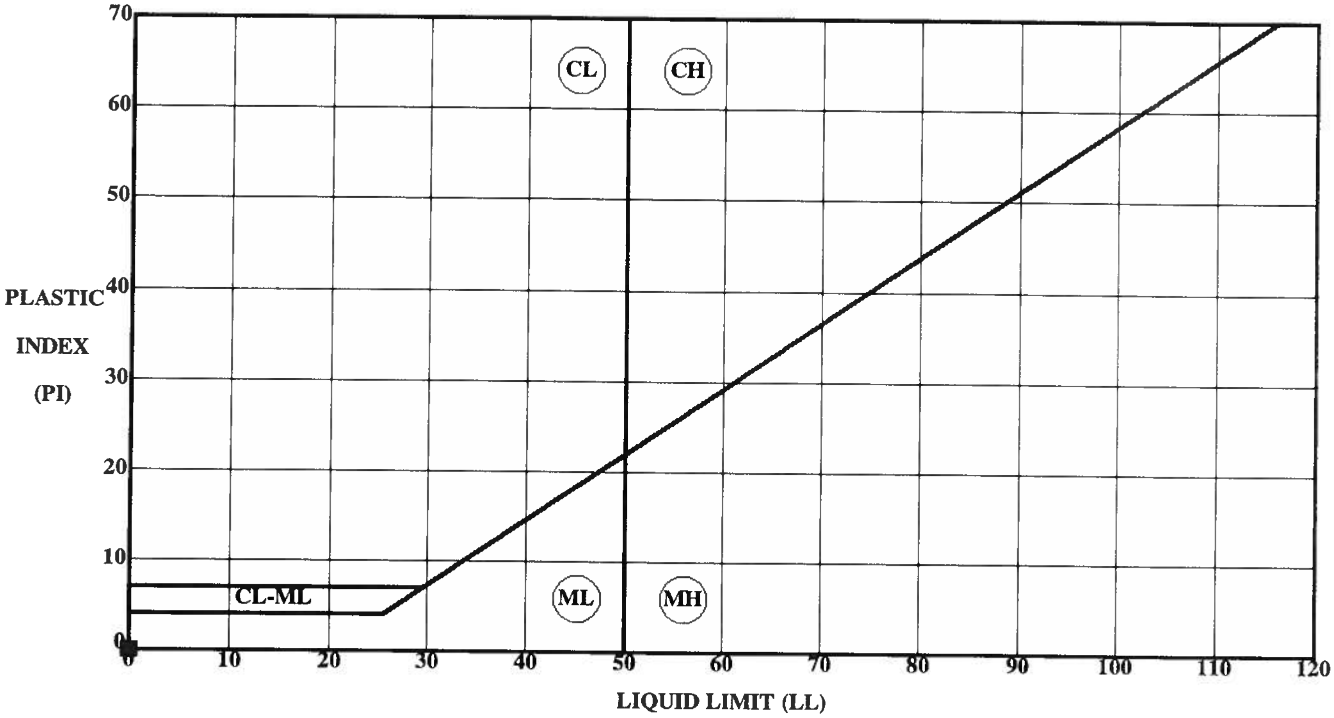
PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

ATTERBERG LIMITS
TEST RESULTS

PLATE
B-18



	Exploration No.	Depth, ft.	LL	PL	PI	Fines	Classification
●	MB-53	6.0	NP	NP	NP	6.6	WELL GRADED GRAVEL with SILT and SAND (GW-GM)
☒	MB-57	15.0	NP	NP	NP	4.0	POORLY GRADED SAND with GRAVEL (SP)

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PROJECT NO. 31-215904

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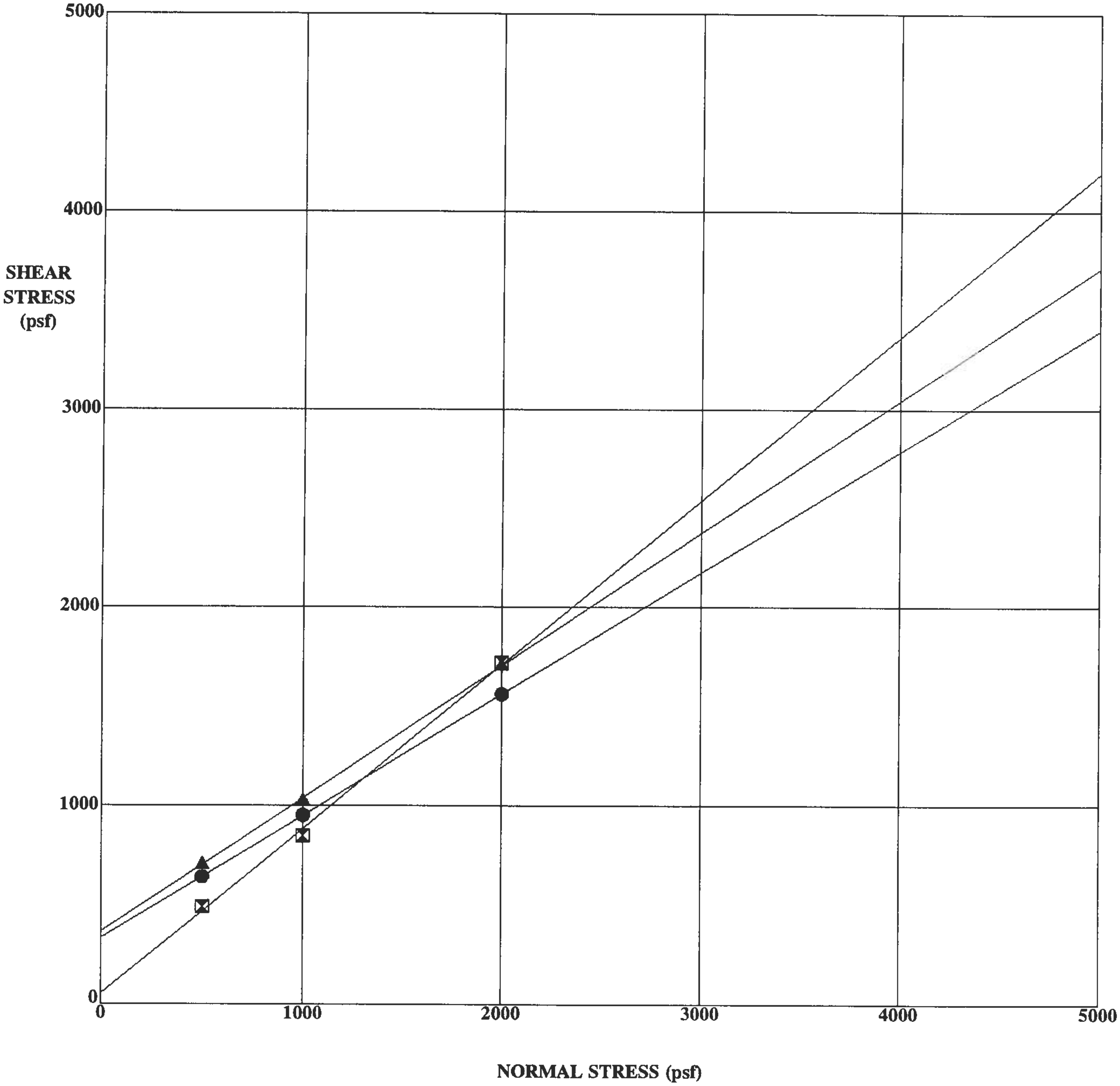
ATTERBERG LIMITS
TEST RESULTS

PLATE
B-19



	Exploration No.	Depth (ft.)	Soil Description	PHI Angle Degrees	Cohesion (psf)
●	DB- 2	5.5	CLAYEY SAND (SC)	32	335
☒	DB- 4	5.0	WELL GRADED GRAVEL (GW) with sand	40	55
▲	DB- 5	10.0	POORLY GRADED SAND (SP-SM)	34	370

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PROJECT NO. 31-215904

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DIRECT SHEAR TEST RESULTS

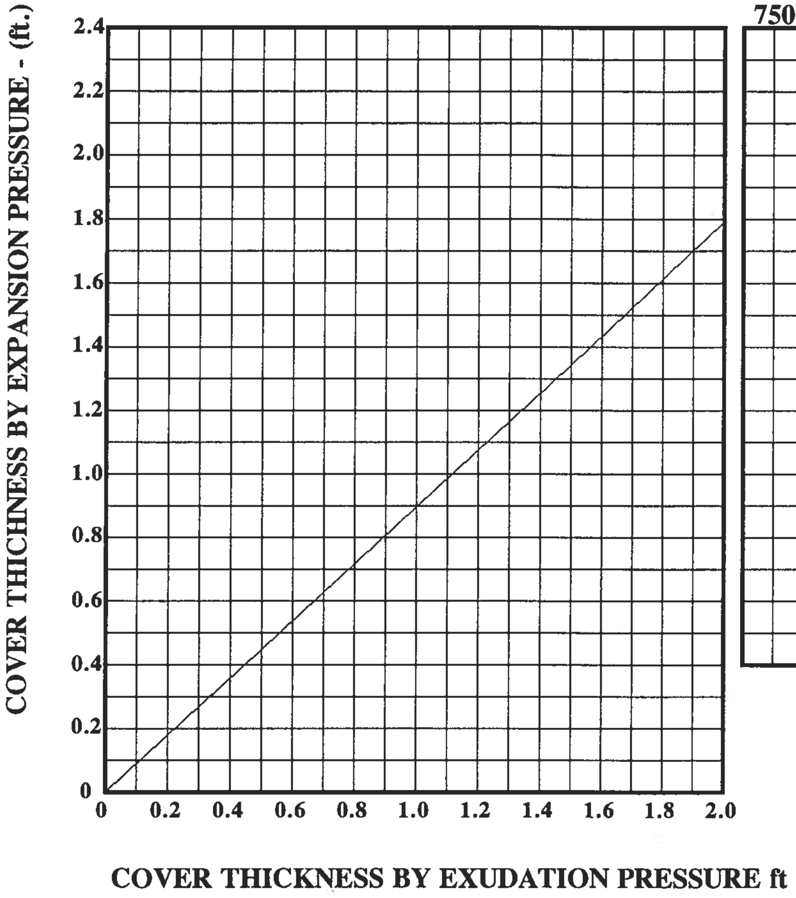
PLATE
B-20

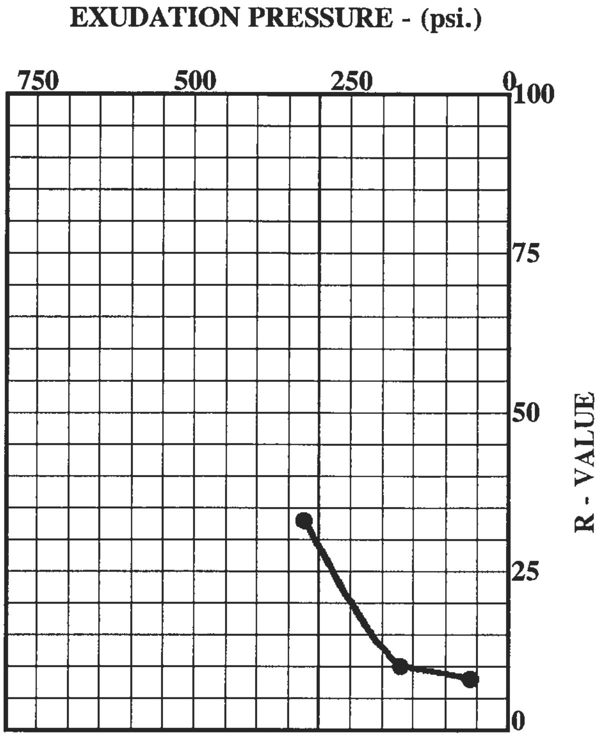
DATE SAMPLED 2-24-95

SAMPLE DESCRIPTION SILTY SAND (SM)

SAMPLE LOCATION MB- 1 @ 6.0 ft.

TEST METHOD ASTM D2844





SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	61	171	325
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	8	10	33
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	28		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

RESISTANCE VALUE

PLATE

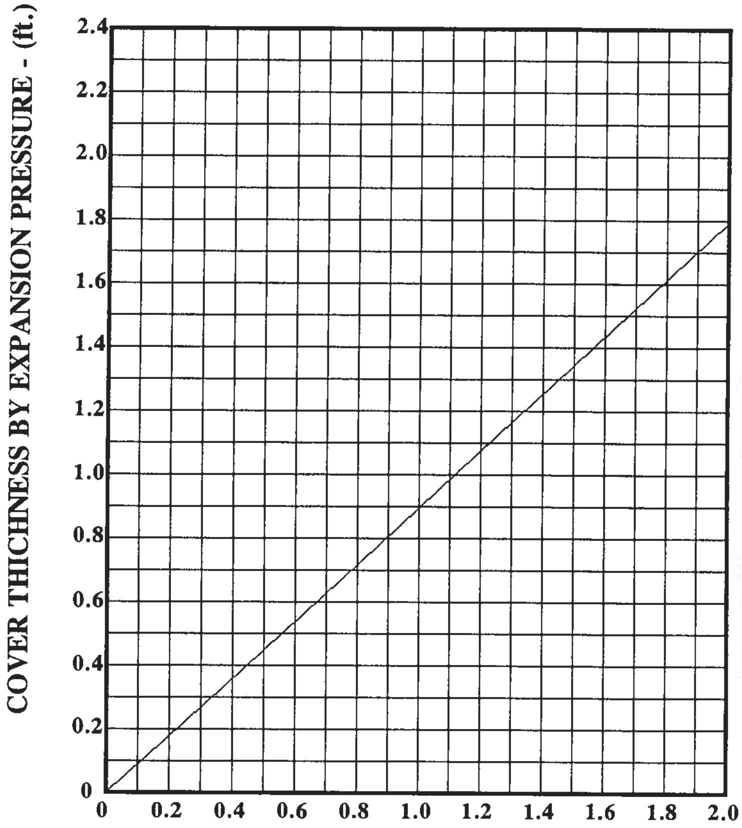
B-21

DATE SAMPLED 5-15-95

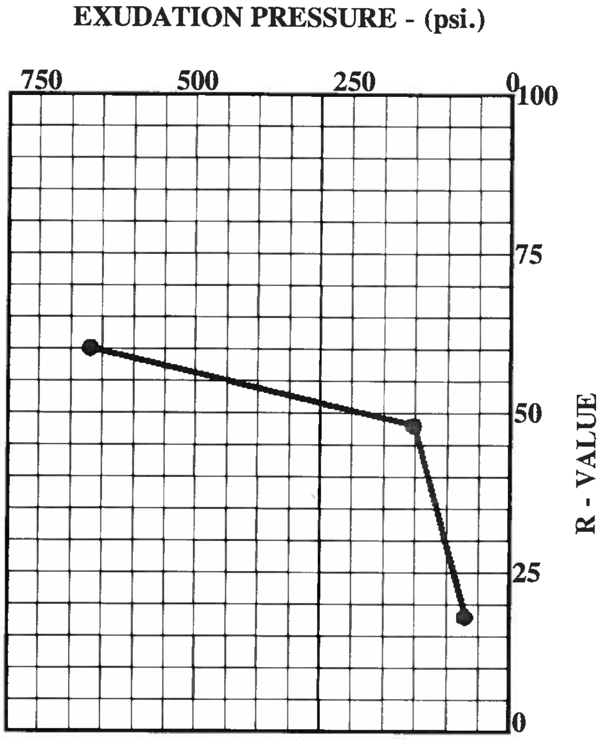
SAMPLE DESCRIPTION SILTY SAND (SM)

SAMPLE LOCATION MB- 2 @ 0.5 ft.

TEST METHOD ASTM D2844



COVER THICKNESS BY EXUDATION PRESSURE ft



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	669	1154	172
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	60	48	18
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	53		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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RESISTANCE VALUE

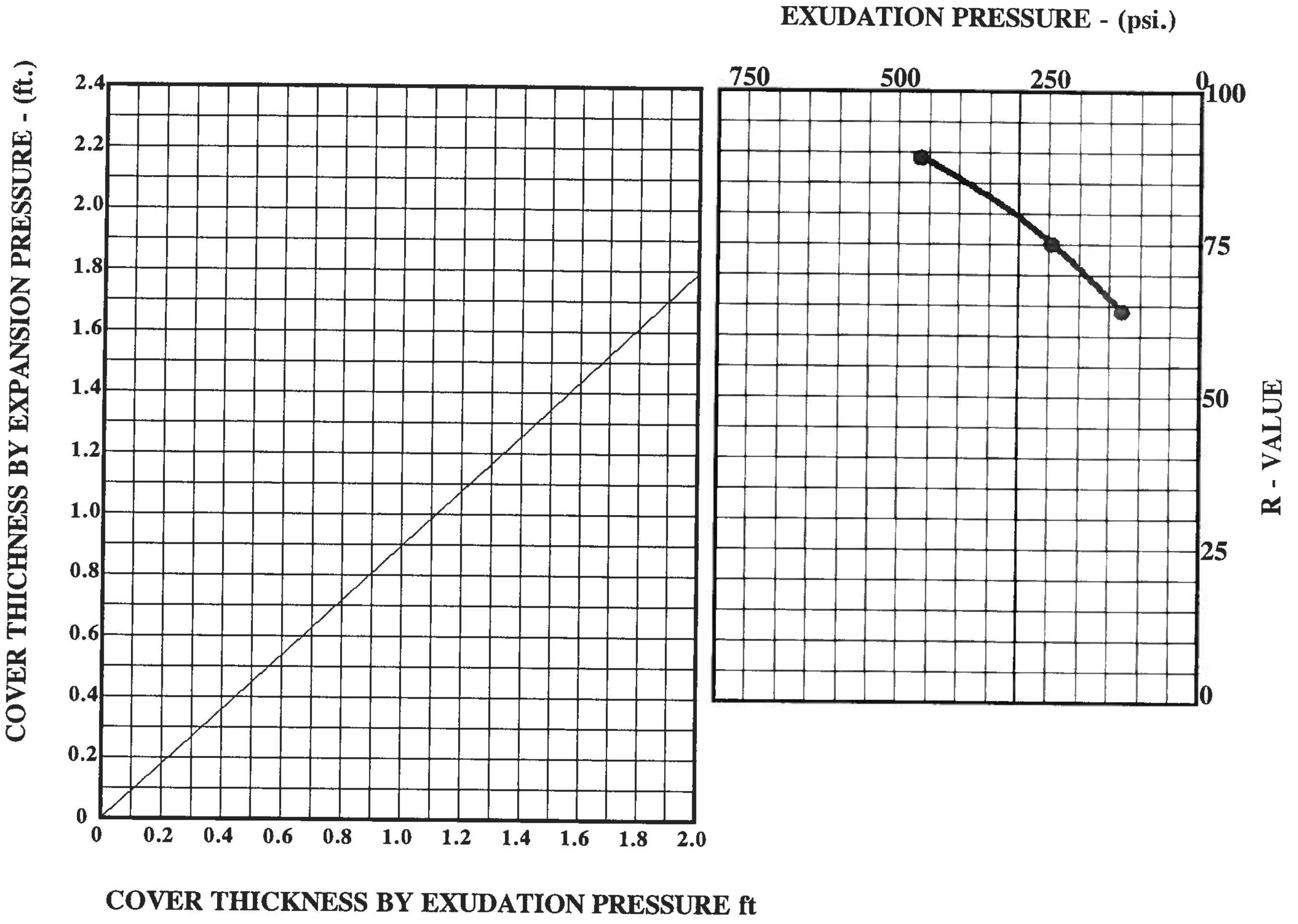
PLATE
B-22

DATE SAMPLED 3-4-95

SAMPLE DESCRIPTION SANDY GRAVEL (GM)

SAMPLE LOCATION MB- 9 @ 24.0 ft.

TEST METHOD ASTM D2844



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	465	247	131
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	89	75	64
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	78		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

RESISTANCE VALUE

PLATE

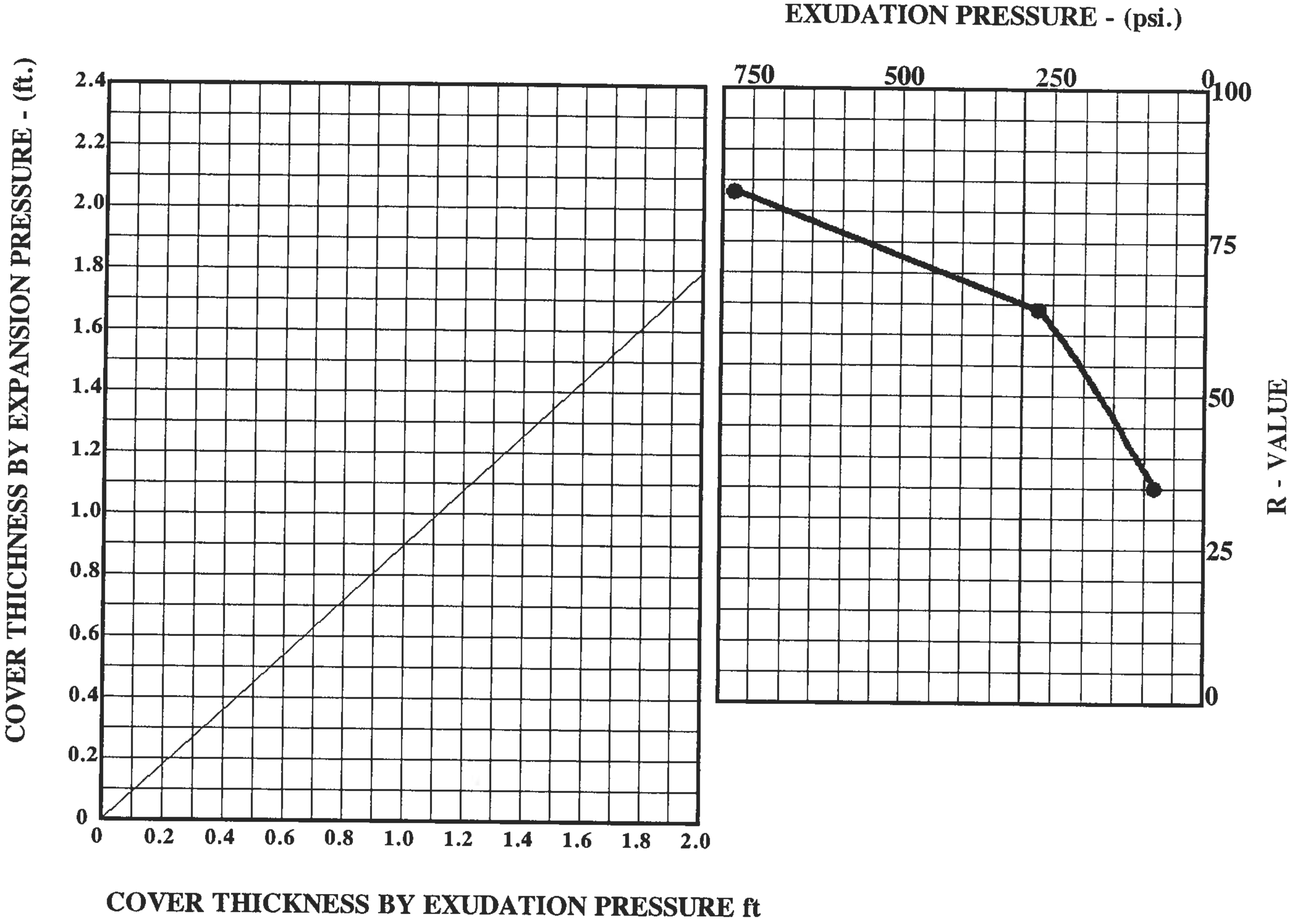
B-23

DATE SAMPLED 2-25-95

SAMPLE DESCRIPTION GRAVEL (GP-GM)

SAMPLE LOCATION MB-15 @ 25.0 ft.

TEST METHOD ASTM D2844



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	781	275	84
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	83	64	35
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	67		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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RESISTANCE VALUE

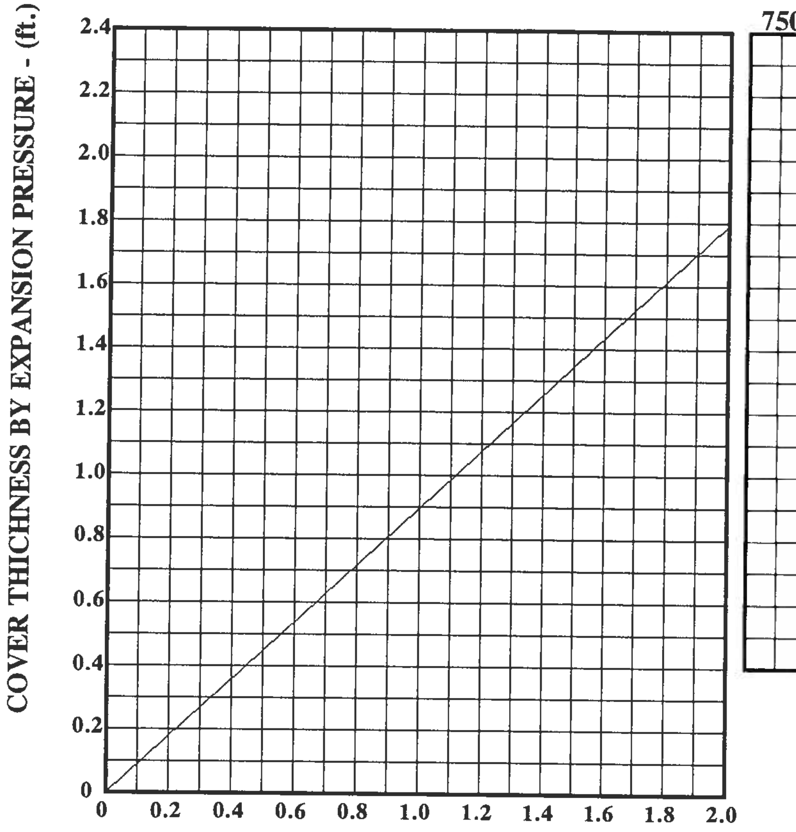
PLATE
B-24

DATE SAMPLED 2-13-95

SAMPLE DESCRIPTION SILTY SAND (SM)

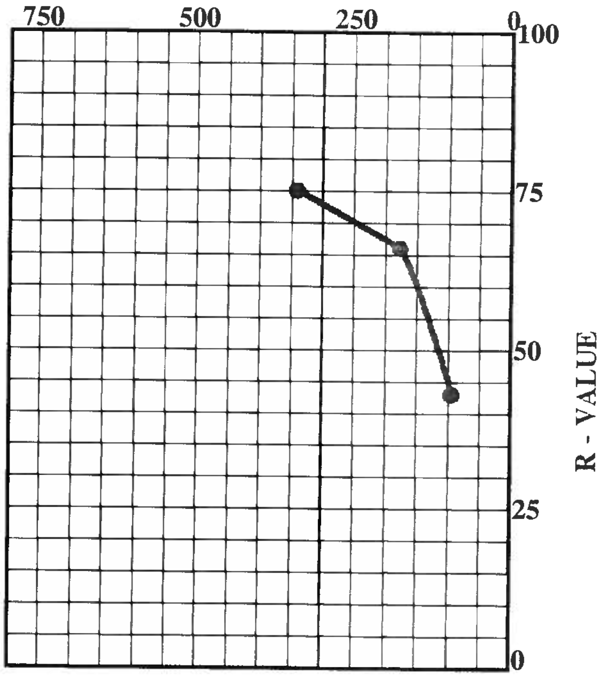
SAMPLE LOCATION MB-19 @ 6.0 ft.

TEST METHOD ASTM D2844



COVER THICKNESS BY EXUDATION PRESSURE ft

EXUDATION PRESSURE - (psi.)



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	96	178	342
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	43	66	73
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	73		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

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RESISTANCE VALUE

PLATE

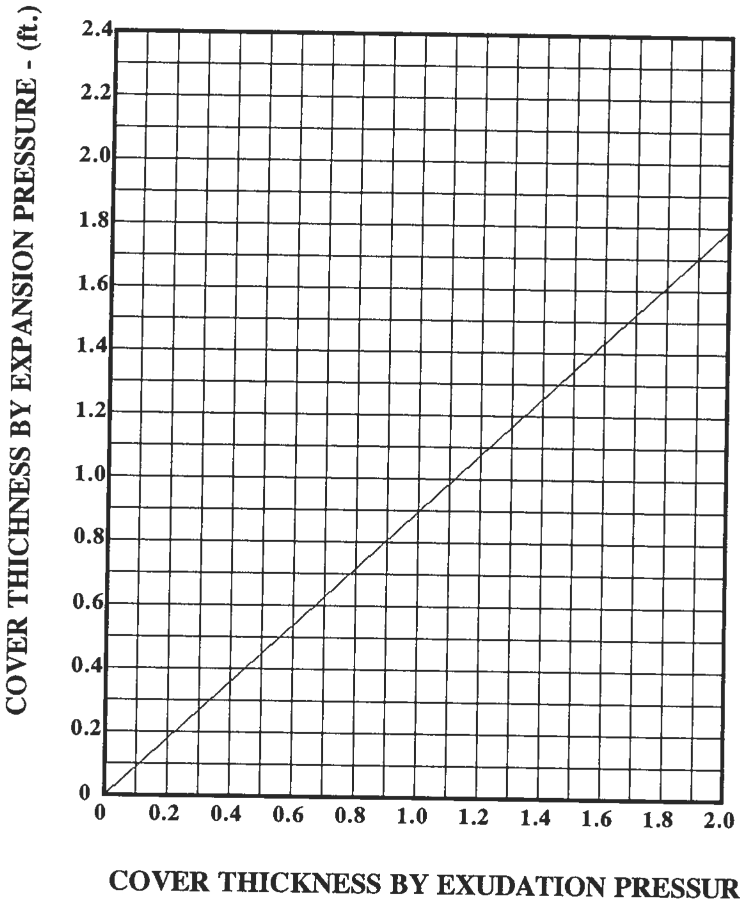
B-25

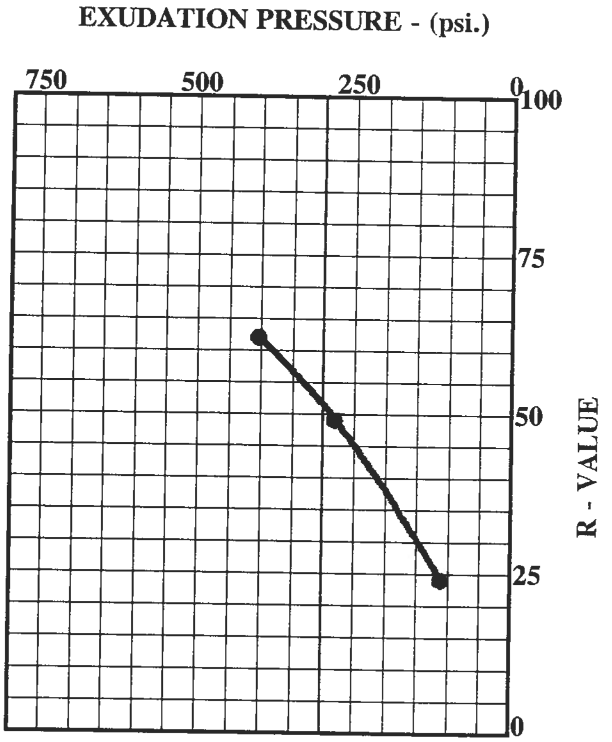
DATE SAMPLED 2-24-95

SAMPLE DESCRIPTION CLAYEY SAND (SC)

SAMPLE LOCATION MB-21 @ 30.0 ft.

TEST METHOD ASTM D2844





SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	113	283	405
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	24	49	62
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE		51	
R - VALUE BY EXPANSION PRESSURE (TI=)			

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RESISTANCE VALUE

PLATE

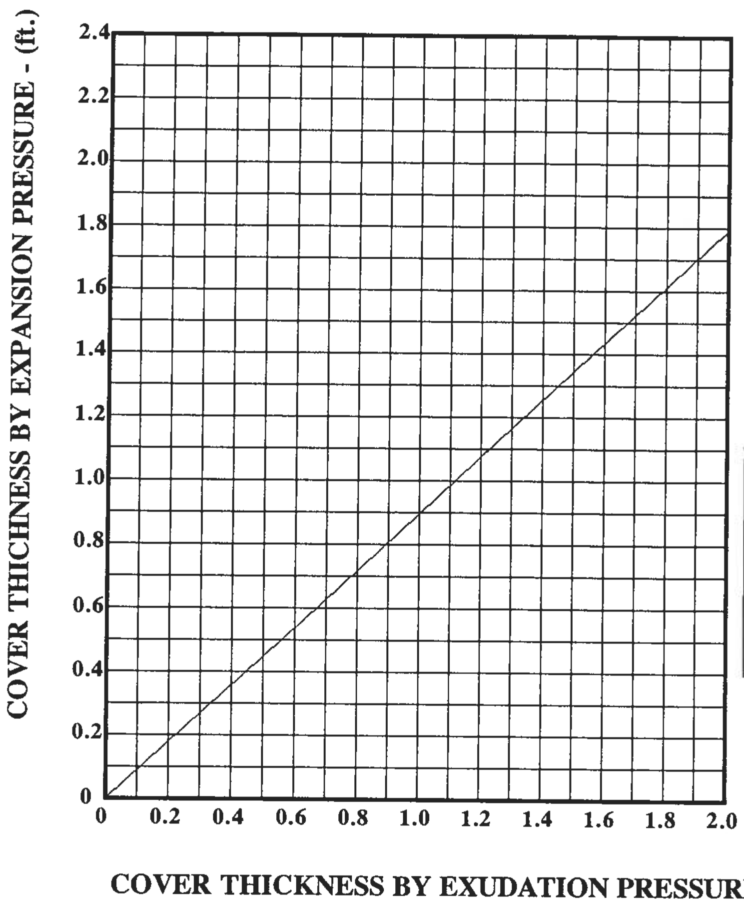
B-26

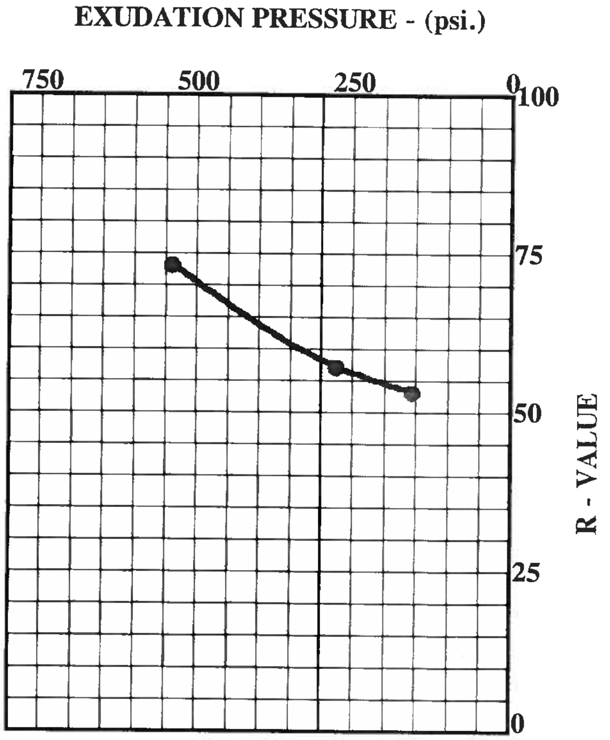
DATE SAMPLED 3-7-95

SAMPLE DESCRIPTION SILTY SAND (SM)

SAMPLE LOCATION MB-26 @ 15.0 ft.

TEST METHOD ASTM D2844





SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	541	277	157
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	73	57	53
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	58		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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RESISTANCE VALUE

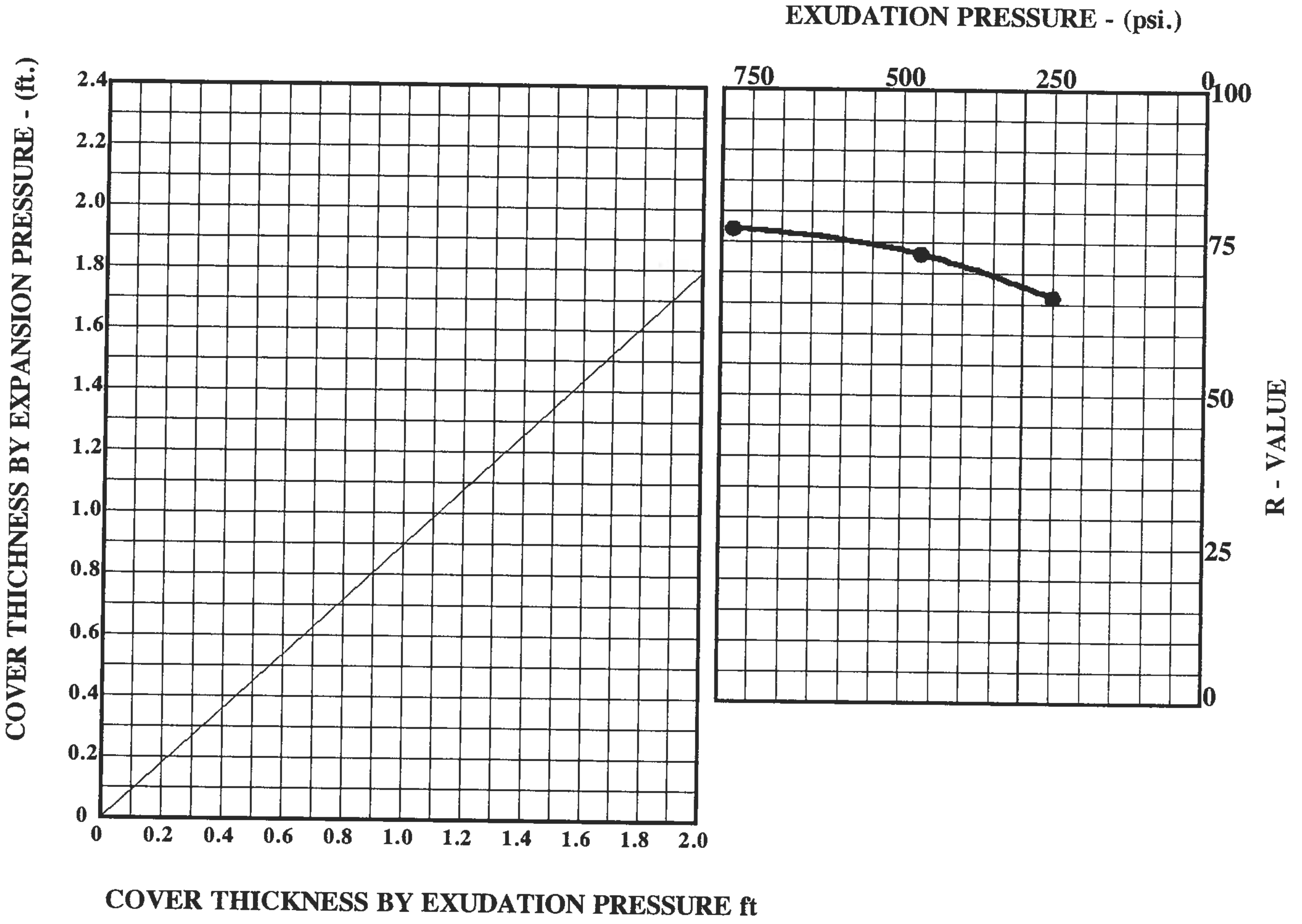
PLATE
B-27

DATE SAMPLED 2-13-95

SAMPLE DESCRIPTION SILTY SAND (SM)

SAMPLE LOCATION MB-30 @ 10.0 ft.

TEST METHOD ASTM D2844



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	252	470	781
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	66	73	77
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	68		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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Beltway, Section 6C

RESISTANCE VALUE

PLATE

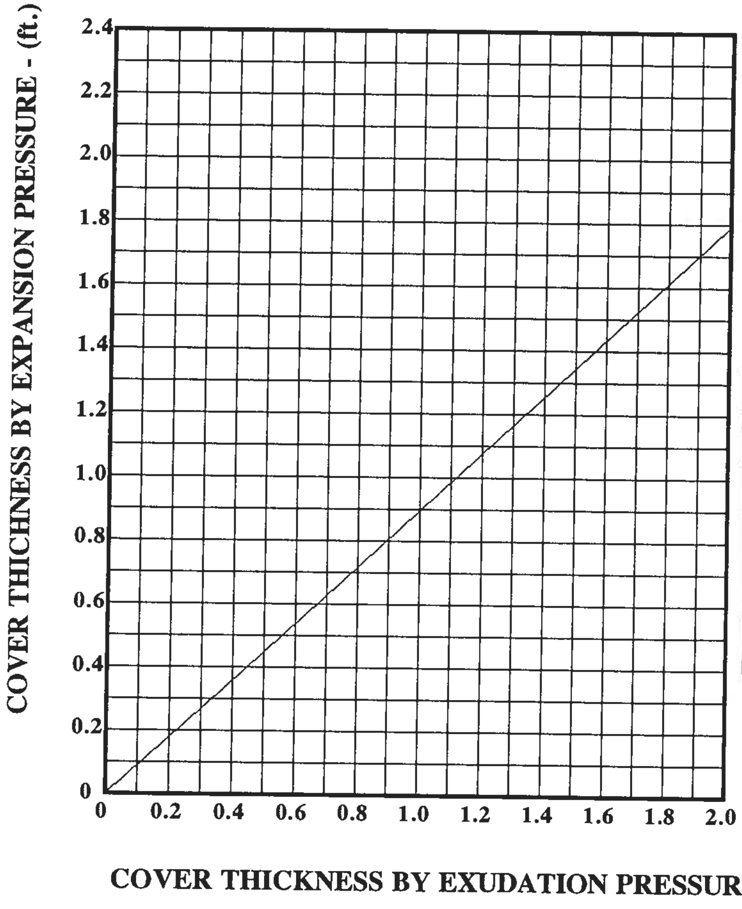
B-28

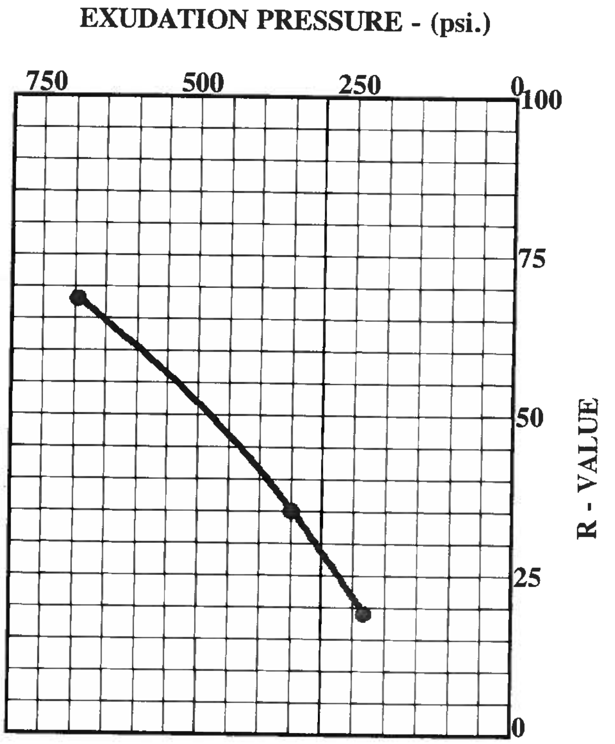
DATE SAMPLED 2-15-95

SAMPLE DESCRIPTION SANDY CLAY (CL)

SAMPLE LOCATION MB-43 @ 3.0 ft.

TEST METHOD ASTM D2844





SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	695	350	234
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	68	35	19
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	28		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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PROJECT: Southern Segment, Las Vegas
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RESISTANCE VALUE

PLATE

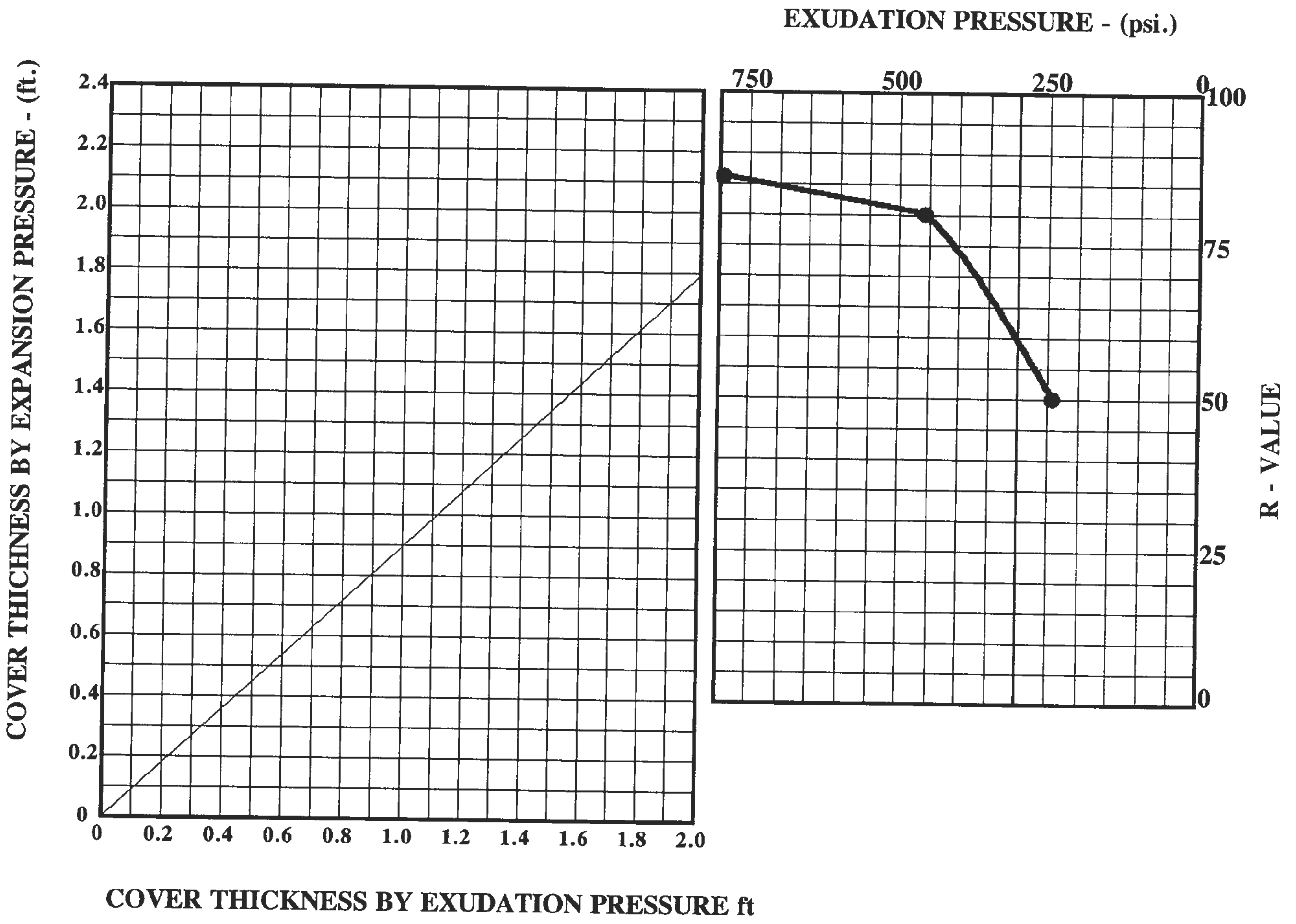
B-29

DATE SAMPLED 2-22-95

SAMPLE DESCRIPTION CLAYEY SAND (SC)

SAMPLE LOCATION MB-45 @ 15.0 ft.

TEST METHOD ASTM D2844



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	795	458	244
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	86	80	50
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	60		
R - VALUE BY EXPANSION PRESSURE (TI=)			

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

RESISTANCE VALUE

PLATE

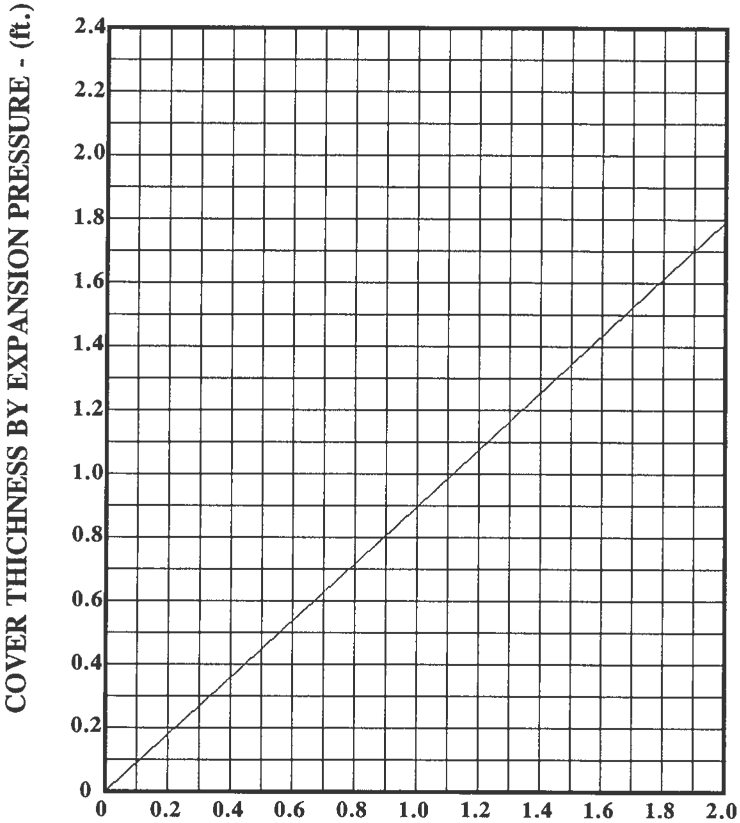
B-30

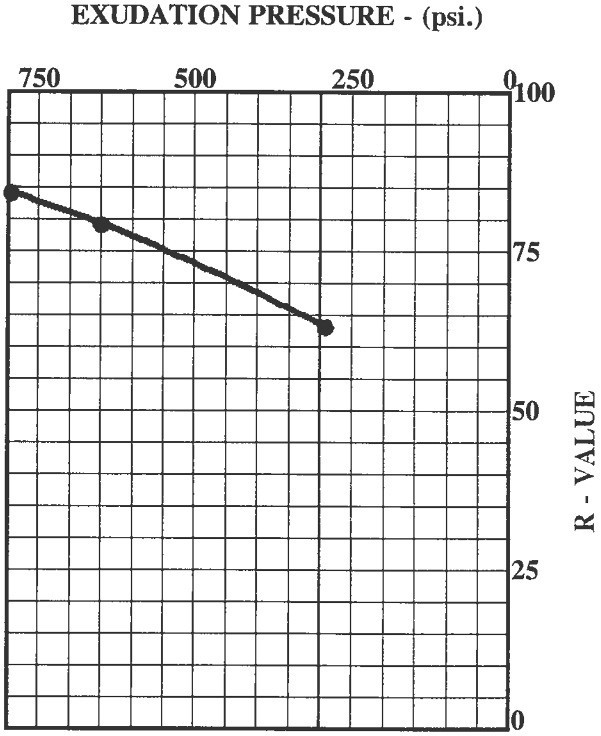
DATE SAMPLED 2-16-95

SAMPLE DESCRIPTION SILTY SAND (SM)

SAMPLE LOCATION MB-50 @ 10.0 ft.

TEST METHOD ASTM D2844





COVER THICKNESS BY EXUDATION PRESSURE ft

SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	795	650	293
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	84	79	63
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE		64	
R - VALUE BY EXPANSION PRESSURE (TI=)			

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PROJECT NO. 31-215904

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RESISTANCE VALUE

PLATE

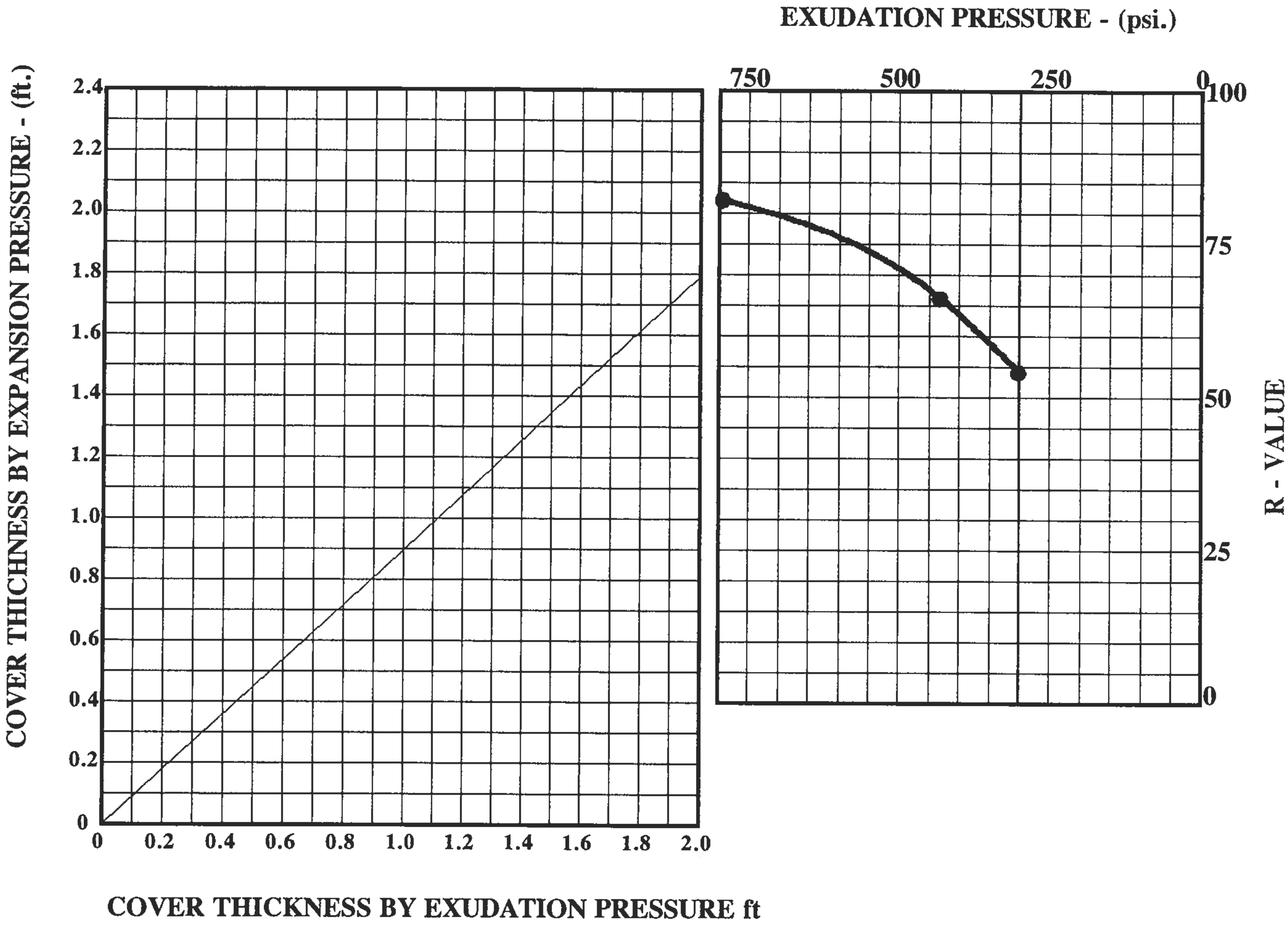
B-31

DATE SAMPLED 2-17-95

SAMPLE DESCRIPTION SAND (SP-SM)

SAMPLE LOCATION MB-52 @ 5.0 ft.

TEST METHOD ASTM D2844



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	795	433	303
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	82	66	54
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	53		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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RESISTANCE VALUE

PLATE

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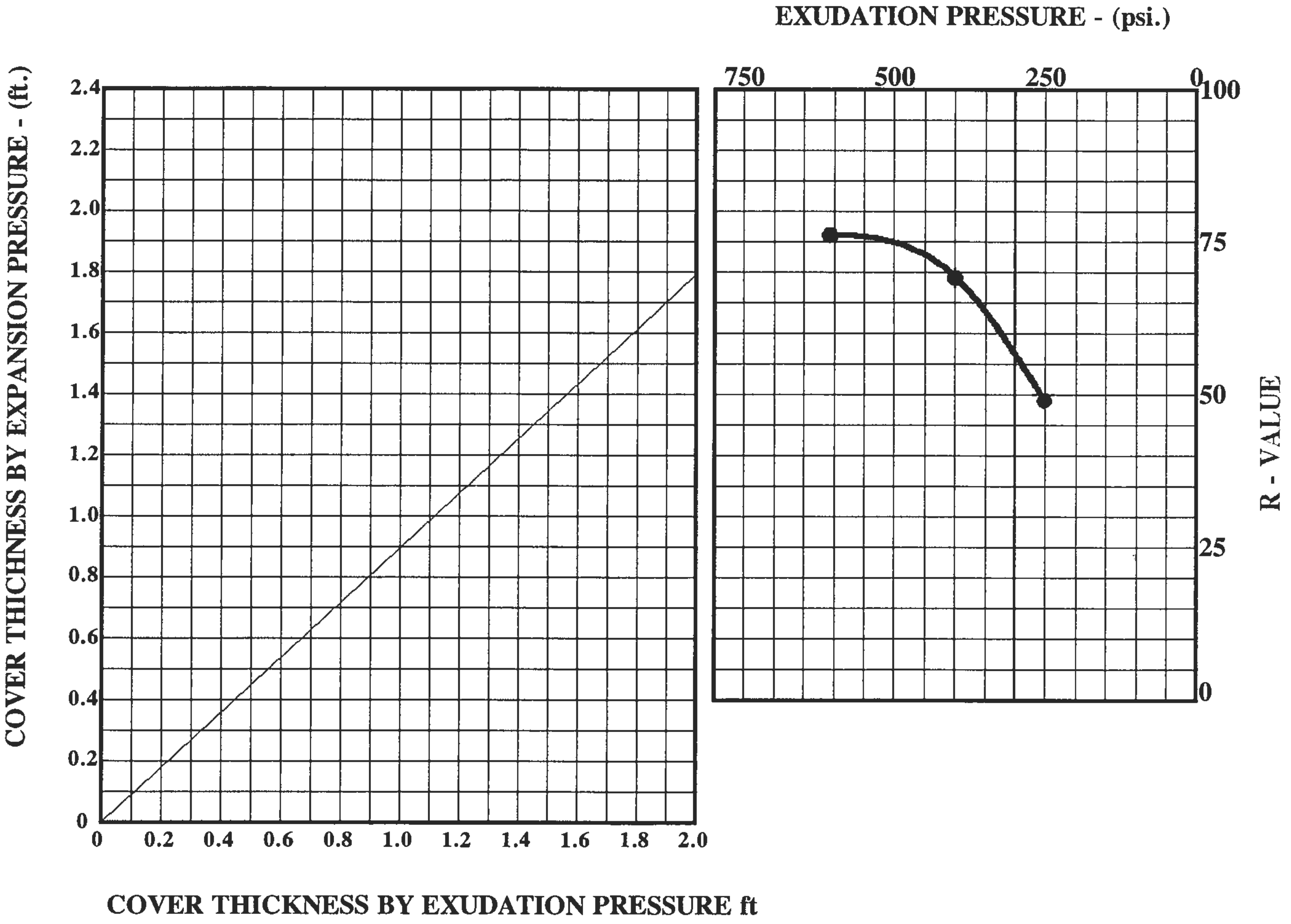
DATE SAMPLED 2-15-95

SAMPLE DESCRIPTION SILTY SAND (SM)

SAMPLE LOCATION MB-55 @ 6.0 ft.

TEST METHOD ASTM D2844



SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	607	401	253
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	76	69	49
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	57		
R - VALUE BY EXPANSION PRESSURE (TI=)			

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PROJECT NO. 31-215904

PROJECT: Southern Segment, Las Vegas Beltway, Section 6C

RESISTANCE VALUE

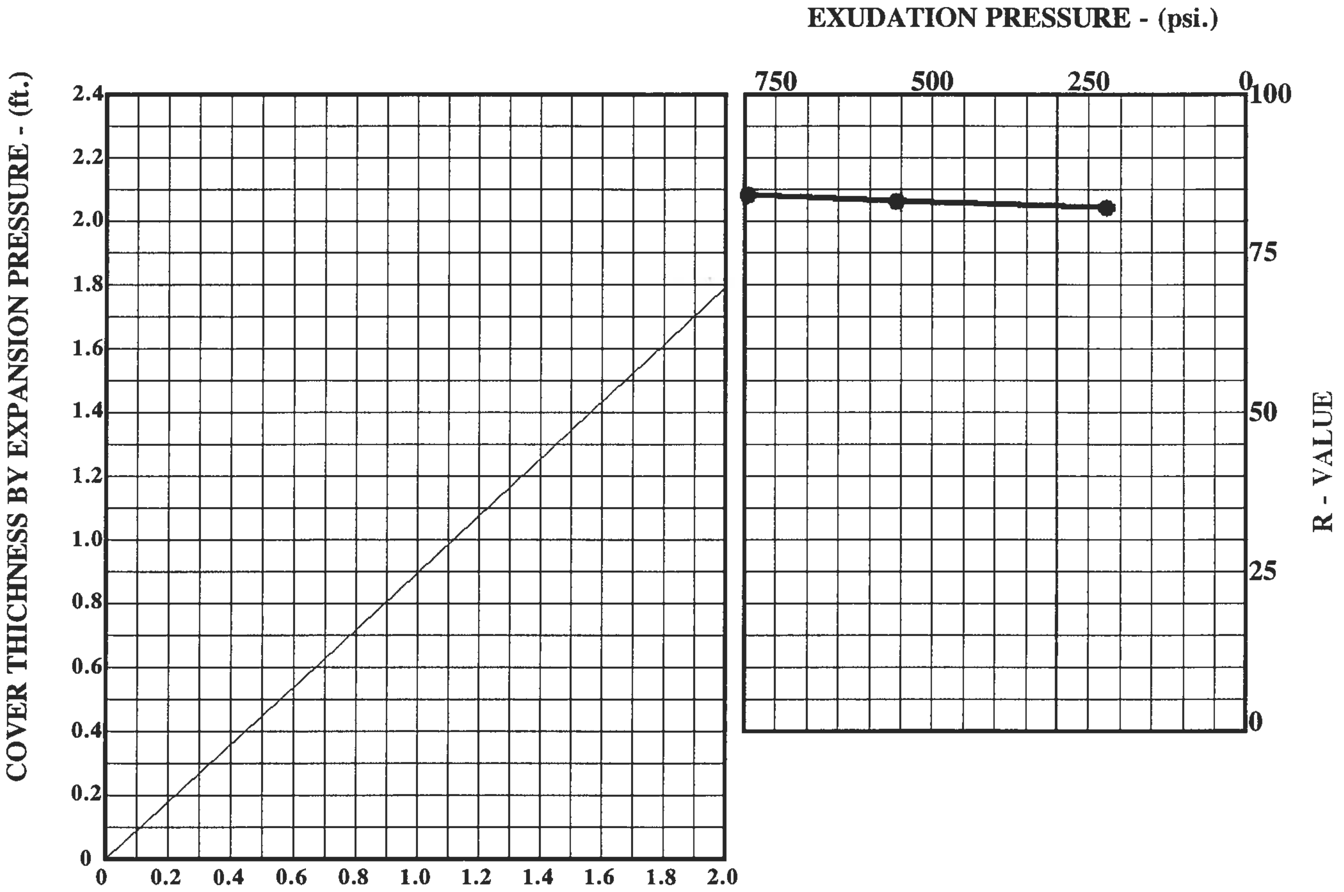
PLATE
B-33

DATE SAMPLED 3-6-95

SAMPLE DESCRIPTION SAND (SP)

SAMPLE LOCATION MB-57 @ 25.0 ft.

TEST METHOD ASTM D2844



COVER THICKNESS BY EXUDATION PRESSURE ft

SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	795	558	223
EXPANSION PRESSURE (psf)			
RESISTANCE VALUE - R	84	83	82
% MOISTURE AT TEST (by weight)			
DRY DENSITY (pcf)			
R - VALUE @ 300 psi EXUDATION PRESSURE	83		
R - VALUE BY EXPANSION PRESSURE (TI=)			

KLEINFELDER

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RESISTANCE VALUE

PLATE

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